DEPARTMENT OF AGRICULTURE
CANADA

ANNUAL REPORT

OF THE

FOREST INSECT AND DISEASE SURVEY

DIVISION OF FOREST BIOLOGY
SCIENCE SERVICE

1951

Published by Authority of the Rt. Hon. JAMES G. GARDINER, Minister of Agriculture
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FOREWORD

In January, 1951, the Division of Forest Biology of Science Service was organized with a view to co-ordinating all activities of Science Service relating to forestry. The Division consists of two principal units: Forest Zoology and Forest Pathology. Inasmuch as both units co-operate in surveying the forests for the presence of insects and diseases and inasmuch as, in many instances, diseases and insects are closely associated with each other, it was decided that, in the future, the results of these combined surveys should be presented in a single report to be made available to the forest services, the forest industries and other organizations concerned with forest conservation.

It is hoped that, through the presentation of a more complete biological assay, the usefulness of the annual report will be greatly enhanced and that the innovation will be as favourably received as was a similar change in the editorial policy of the Bi-Monthly Progress Report of the Division. The slight modification in the title of the report should not be considered as constituting a break in continuity but rather as a widening in scope resulting from recent developments in the general organization of the Service.

Comments and constructive suggestions regarding this new procedure will be gratefully received.

J. J. DE GRYSE,
Chief, Division of Forest Biology.

MARITIME PROVINCES

W. A. Reeks, R. S. Forbes, and F. G. Cuming

Dominion Entomological Laboratory, Fredericton, N.B.

INTRODUCTION

In previous years the Survey has emphasized the quantity of insect collections. In 1951 more emphasis was placed on quality. The Forest Insect Rangers were required to do more intensive sampling. A large part of their time was devoted to aerial and ground surveys of defoliation during the height of the sampling period. For extensive sampling the laboratory was more dependent on the assistance of workers in industry and in government services and particularly to those whose names are listed at the end of this section of the report. Greater use was made of aircraft in plotting the distribution of outbreaks, and the co-operation of the aerial patrols of the Department of Lands and Forests of Nova Scotia, the New Brunswick Forest Service, and the Newfoundland Forest Protection Association is gratefully acknowledged.

Insect collections totalled 2,497, and were distributed by provinces as follows: New Brunswick, 1,327; Nova Scotia 713; Prince Edward Island 26; and Newfoundland 431. Special reports on insect conditions numbered 370. The majority of the collections were taken from coniferous trees, as shown in the following synopsis.

Coniferous hosts	Collections	Deciduous hosts	Collections
Spruce	1,048	Birch	69
Balsam fir	694	Aspen	56
Larch	117	Beech	27
Pine	66	Maple	24
Cedar	16	Elm	19
Hemlock	12	Oak	13
Mixed hosts	125	Others	211
Total	2,078	Total	419

Grand Total—2,497

IMPORTANT INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.).—Severe frosts in early June caused considerable killing of the new shoots of balsam fir trees in parts of northern New Brunswick. The affected foliage turned red and could not be distinguished readily from defoliation by the budworm. Consequently, a good deal of ground work had to be done to supplement the aerial survey, which was carried out from July 4 to 17. Some 26 flying hours were spent on the aerial survey of the budworm outbreak in New Brunswick, and six hours in Nova Scotia. Ground surveys consisted of late larval, pupal, and egg counts by branch sampling, random sampling, and estimates of defoliation at points along trails or forest roads. These records were used to map three degrees of infestation. Areas from which only one or two budworms were taken in the collections are not included in the infested areas shown on the map.

In New Brunswick, the severely infested areas totalled about 2,200 square miles, an increase from 400 square miles reported in 1950. The outbreak was again confined to the northern part of the Province. The most severe infestation

occurred on the Upsalquitch Watershed, extending to some of the headwaters of the Nipisiguit River. Many mature stands of balsam fir in this region had lost all their current foliage and most of the old foliage dating from 1948. The killing of leaders was common, and in some stands up to 50 per cent of the leaders were dead. Conditions were similar in other smaller areas, particularly the upper drainages of Boston Brook and Jardine Brook. The feeding on the current foliage of balsam fir was severe near Long Lake, Trouser's Lake, Tobique River, Kedgwick River, and the northeastern part of the Green River Watershed. In most of these areas, however, the infestations were more recent, and the accumulated loss of foliage from the feeding of previous years was less than on the Upsalquitch Watershed. Young stands of balsam fir lost most of their new foliage in some areas, particularly in sections of the Miramichi Watershed, and near Black Brook north of the Stewart Highway. Although the severity of attack showed a general increase, some improvement was indicated in the Quisibis area and at one or two points near the western end of the Stewart Highway. These areas had been cut over in recent years, and the stands are not considered to be highly vulnerable. The abundance of moths and eggs in 1951 suggests that the outbreak will continue to be severe in New Brunswick in 1952.

In Nova Scotia more collections contained budworm larvae than in 1950, and the population increased in Cape Breton Island. Random sampling showed the budworm to be present in the following counties: Antigonish, Colchester, Guysborough, Inverness, Lunenburg, Pictou, and Victoria. Defoliation was negligible except in Inverness County, where a severe outbreak occurred in the vicinity of Strathlorne, north of Lake Ainslie. The area covered about 4 square miles. The outbreak was confined mainly to white spruce, which had lost about 65 per cent of the new foliage. Pupal and egg counts showed that the populations were much lighter than in New Brunswick. If the outbreak follows the same trend as the last one in Cape Breton Island, it may continue for several years without causing any appreciable killing of trees.

In Newfoundland small numbers of larvae were taken near St. John's and at widely separated points in the districts of Humber, St. George's, White Bay, and Grand Falls. No outbreaks were reported.

Two collections from Prince Edward Island contained budworm larvae. One specimen was collected near Montague, and five were taken near Upton Field.

	Reports	Collections	Larvae per Tree Sample	
			Av.	Dev. from 1950
New Brunswick.....	25	339	11·8	+5·4
Nova Scotia.....	3	51	3·4	−0·5
Prince Edward Island....	—	2	1·2	—
Newfoundland.....	—	8	0·3	−1·4

Black-headed Budworm, *Acleris variana* (Fern.).—The status of the black-headed budworm outbreaks improved in 1951.

The limits of the infestations at MacGregor Brook and French Mountain in Cape Breton Island remained much the same, but the larval population and loss of new foliage declined from 1950. In 1951 the average number of larvae per 100 square feet of balsam fir foliage varied from 621 to 951, compared with a range of 1,421 to 3,589 in 1950. With the exception of localities in Richmond and Cape Breton counties, where numbers were slightly higher than last year, random sampling also showed a general decrease in numbers.

In Newfoundland the infestations in the Bonavista area and at Neyle's Bridge, Grand Fall's District, subsided in 1951 without killing any trees or

causing appreciable increment loss. Defoliation estimates near Gambo Pond showed that the loss of current foliage of balsam fir was reduced to about 25 per cent in 1951. The rearing of 1950 collections from these areas indicated that native parasites were largely responsible for the reduction of budworm numbers.

There were no outbreaks in New Brunswick or in Prince Edward Island.

	Reports	Collections	Larvae per Tree Sample	
			Av.	Dev. from 1950
New Brunswick	1	58	0·3	−0·2
Nova Scotia	6	136	10·8	−0·6
Prince Edward Island	—	3	3·5	+2·5
Newfoundland	4	70	1·1	−2·2

Balsam Woolly Aphid, *Adelges piceae* (Ratz.).—Aerial and ground surveys by W. J. Carroll and W. C. Parrott have fairly accurately defined the distribution of this species in southwestern Newfoundland. The insect was found at Stephenville Crossing, which is about 25 miles north of the limit recorded in 1950. The infestation extended easterly to the Long Range Mountains, as shown on the accompanying map. The smaller infestation in the St. John's area showed no apparent change in area or in severity of attack.

Previous reports have stated that "gout" was the most common form of attack in Newfoundland and that "stem attack" was rare. In 1951 an area of severe "stem attack" was found near Robinsons, indicating that this form of attack is more common on the "front" of the infestation and that it is followed by "gout" after the initial impact of the outbreak.

In the early winter of 1950-51 balsam-fir trees were tallied on lines selected at random to determine the degree of attack by the insect in Nova Scotia and in New Brunswick. Some 9,000 trees were classified. The most severe attack occurred along the south shore of Nova Scotia, where 11 per cent of the trees tallied were dead and 63 per cent of other living trees were infested. The proportion of dead and infested trees showed a gradual decrease northward through Colchester and Cumberland counties, the south shore of New Brunswick, and the lower St. John Valley. The largest trees were generally the most severely infested.

An examination of 7·3 square feet of severely infested balsam fir bark from Robinsons, Newfoundland, showed the presence of only native predators. The most important was *Leucopis americana* Malloch, which was represented by 19 sound and 12 empty puparia. A program of biological control was initiated in 1951, and three species of European predators were released in central New Brunswick against the balsam woolly aphid.

	Reports
New Brunswick	4
Nova Scotia	55
Newfoundland	2

Eastern Hemlock Looper, *Lambdina fiscellaria fiscellaria* (Guen.).—All of the known outbreaks of this species in Newfoundland had subsided by 1951. A high incidence of a larval disease at George's Lake in 1950 was followed by a very light larval population in 1951. The mortality from disease in this area was reduced from about 70 per cent in 1950 to 10 per cent in 1951, and larval parasitism amounted to about 27 per cent. One of the parasites reared was tentatively determined as *Winthemia occidentis* Reinhard, which was recently introduced from British Columbia.

A rise in population was apparent in eastern Nova Scotia, but no outbreaks were reported.

	Reports	Collections	Larvae per Tree Sample	
			Av.	Dev. from 1950
New Brunswick	—	44	0·3	−0·2
Nova Scotia	3	58	1·3	−1·6
Prince Edward Island	—	3	0·7	—
Newfoundland	7	44	1·7	−3·8

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.—An aerial survey of defoliation of aspen stands in New Brunswick was made on June 14, 16, and 18. Stands that were moderately to severely defoliated were easily recognized from the aircraft at about 2,000 feet. Approximate areas in which such stands were plotted, and others that were surveyed on the ground, are recorded on the accompanying map.

The New Brunswick outbreak tended to spread southward to southeasterly, but in the St. John Valley the infestation also spread northward into areas where some improvement had been noted in 1950. Although trembling aspen was the principal host, red oak, white birch, and grey birch were generally defoliated. Birch trees were severely attacked only after aspen trees had been completely defoliated.

Other outbreaks continued in Nova Scotia, the largest occurring in the Annapolis Valley between Bridgetown and Kentville. Small infestations occurred northwest of Springhill and near Maccan in Cumberland County, near Tatamagouche in Colchester County, near New Glasgow in Pictou County, and at Shelburne in Shelburne County.

In Prince Edward Island small numbers of larvae were found east of Hunter River and near Mt. Hebert Station in Queens County.

Near Fredericton, where the outbreak has been severe for 3 consecutive years, D. G. Cameron reported higher mortality of larvae from disease and parasites than in 1950. Of nearly 2,000 larvae collected from June 18 to June 29, about 84 per cent were diseased. Of those that survived and reached the pupal stage, 78 per cent were parasitized.

	Reports	Collections
New Brunswick	33	58
Nova Scotia	6	6
Prince Edward Island	1	1

European Winter Moth, *Operophtera brumata* (L.).—Additional information on the distribution of this species has been obtained by collecting larvae in the early summer and by trapping adults on banded trees at strategic points in the autumn. The accompanying map shows the known distribution of the insect, which extends beyond the limits shown in 1950, and includes localities near Maitland Bridge and Greywood in Annapolis County, and three points near Dalhousie East in Kings County. The infestation also extended slightly eastward from Cole Harbour in Halifax County.

The most severe infestations showed little change from 1950. The principal hosts were oak, maple, basswood, ironwood, and elm.

No parasites have issued from some 4,000 field-collected larvae that were reared in 1950 and in 1951. A study of the possibilities of biological control has been initiated.

	Reports	Collections
Nova Scotia	76	26

The Fall Cankerworm, *Alsophila pometaria* (Harr.).—This insect caused partial defoliation of elm in Fredericton, along the Portobello River, and near French Lake, in York and Sunbury counties, N.B. Large flights of moths in these areas suggest a population increase in 1952. Little change occurred in the status of this insect in Nova Scotia. Defoliation was again severe in the Halifax-Spryfield area. In the southwestern areas of Nova Scotia the cankerworm was often found in association with the European winter moth.

	Reports	Collections
New Brunswick	2	—
Nova Scotia	2	30

Birch Casebearer, *Coleophora salmani* Heinr.—Infestations of this insect were more widespread, particularly in New Brunswick. Among the older infestations the most severe occurred near Grand Bay, where the foliage of some white birch trees was completely browned. Most trees in this area showed severe browning in the uppermost part of the crown. The attack was less severe than in 1950 near Welsford and Prince of Wales. New severe infestations occurred on the Kingston Peninsula near Springfield, Kings County, and at Frosty Hollow, Westmorland County. Very light infestations occurred along the lower St. John Valley below Fredericton and in the coastal area of St. John and Charlotte counties.

In Nova Scotia, the outbreak persisted between Joggins and Sand River in Cumberland County, where about 40 per cent of the leaf surface of grey birch turned brown. The attack was less severe than in 1949 or 1950. The insect was common near Truemanville, East Amherst, and Spencer's Island, Cumberland County. The principal hosts were grey birch, white birch, yellow birch, and alder.

Although the insect may have been present in Prince Edward Island for several years, it was found by the Survey for the first time in 1951. About 30 per cent of the foliage was destroyed as a result of the attack in the following localities in Queens County: Brookfield, New Glasgow, North Rustico, and Kinlock.

	Reports	Collections
New Brunswick	6	11
Nova Scotia	3	3
Prince Edward Island	1	—

Beech Scale, *Cryptococcus fagi* (Baer.).—Plot studies by G. W. Barter in central New Brunswick have shown that about 15 per cent of the beech trees have been killed during the past 8 years. Only a small portion of these died in 1951. Recent infestations were light and confined mainly to the root collars and cankered bark of trees that survived earlier attacks. Of trees tallied in Nova Scotia, about 70 per cent of those that recovered from earlier attacks were lightly to moderately reinfested in 1951. Infestations on young and cankered trees tended to be more severe in Prince Edward Island than on the mainland.

	Reports
New Brunswick	4
Nova Scotia	17
Prince Edward Island	1

"Dieback" of Birch.—The following report is based on information supplied by G. W. Barter.

The general improvement in the condition of birch in New Brunswick continued in 1951. This improvement is characterized by more and healthier

foliage on the less severely injured trees and a rather striking decrease in mortality. On plots in the northern and central parts of the Province only 0·5 per cent of the birch trees died in 1951. This mortality was attributed mainly to bronze birch borer attack.

In Nova Scotia, a re-tally of plots in the Lake Ainslie and Whycocomagh areas of Cape Breton Island showed that the accumulated mortality totalled 21 per cent and 33 per cent of the stems, respectively. Farther north in the Big Intervale and Pleasant Bay areas, damage was less severe. Here the accumulated mortality totalled only 7·1 per cent and 2·5 per cent of the stems, respectively. On the mainland of Nova Scotia, observations indicate a continued recovery of the less severely injured trees. This was particularly noticeable in Cumberland and Colchester counties.

"Dieback" has not been observed in the yellow birch stands of Newfoundland, and except for normal decadence, the trees appeared healthy.

	Reports
New Brunswick	3
Nova Scotia	12

Large Aspen Tortrix, *Archips conflictana* (Wlkr.).—D. G. Mott reported an outbreak of this insect on trembling aspen in Madawaska County in 1950 and 1951. The defoliation ranged from 10 to 90 per cent and generally was least severe on dominant trees. He noted some decrease in the attack in some stands as a result of high parasitism in 1950.

The most severe infestation reported by the Survey was in poplar stands adjacent to the Trans-Canada Highway near the New Brunswick-Quebec Boundary. The trees were young, and the defoliation generally ranged from 20 to 70 per cent, although some trees were completely stripped. Associated with the insect were several other species of defoliators, of which the most abundant was *Galerucella decora* (Say). Considerable defoliation of poplar was also reported from St. Quentin, and from the upper watersheds of the Upsalquitch and Nipisiguit rivers.

	Reports	Collections
New Brunswick	2	2

Larch Casebearer, *Coleophora laricella* (Hbn.).—Sampling by F. E. Webb in the Fredericton area showed an 8-fold increase in population over 1950. Severe browning of foliage indicated similar or even greater increases in numbers in the southern part of New Brunswick and the upper St. John Valley. Many stands were completely defoliated at the time of pupation. Similar conditions obtained in the southern part of Cumberland County of Nova Scotia. Other infestations were common in Nova Scotia, Newfoundland, and Prince Edward Island.

	Reports	Collections
New Brunswick	19	28
Nova Scotia	4	6
Prince Edward Island	2	4
Newfoundland	4	30

Larch Sawfly, *Pristiphora erichsonii* (Htg.).—All previously reported outbreaks of this insect in Newfoundland have subsided. Collections were received from widely separated points in the districts of Humber, St. George's, and White Bay. No specimens were collected in the other Maritime Provinces.

	Collections	Larvae per Tree Sample	
		Av.	Dev. from 1950
Newfoundland	12	1·3	+0·2

Leaf Miners on Arborvitae, *Argyresthia thuiella* (Pack.), *A. freyella* Wlshm., and *Recurvaria thujaella* Kft.—Infestations of one or more of these species extended further north into the counties of Sunbury, Gloucester, Victoria, and Kent. In the older infestations the larval population declined considerably; the foliage was still thin, but few if any trees died as the result of earlier attacks.

	Reports	Collections
New Brunswick	6	12

Satin Moth, *Stilpnotia salicis* (L.).—The satin moth was taken at more points in Nova Scotia than in 1950. Defoliation of a few silver poplar trees amounted to about 25 per cent at Springhill, Cumberland County, and at Aylesford, Kings County. Two or three silver poplar trees at Antigonish, Antigonish County, were completely defoliated, and three trees of the same species near Tarbot, Victoria County, were 80 per cent defoliated. Light to moderate defoliation of a few planted poplar trees occurred at Kingston, Kings County, and Wilmot Station, Annapolis County, and North West Arm, Halifax County.

In New Brunswick small numbers of Carolina poplar or willow were moderately to severely defoliated near Jacksonville, Carleton County, at McAdam, York County, and at Upper Cape, Westmorland County.

The introduced parasite, *Apanteles solitarius* (Ratz.), was found in numbers only at Springhill and Halifax, N.S.

	Reports	Collections
New Brunswick	1	3
Nova Scotia	4	6

European Pine Shoot Moth, *Rhyacionia buoliana* (Schiff.).—This insect was again reported from parts of the City of Halifax as causing damage to Scotch pine and Mugho pine.

	Collections
Nova Scotia	4

A Spruce Needle Worm, *Herculia thymetusalis* Wlk.—This insect was very common on black spruce in the Mint Brook and Gambo Pond areas of Newfoundland. Defoliation ranged from 4 to 30 per cent of the current growth. Only the cone-bearing section of the crowns was affected.

	Reports	Collections	Larvae per Tree Sample	
			Av.	Dev. from 1950
New Brunswick	—	3	0·1	—
Newfoundland	3	46	5·8	+3·9

European Spruce Sawfly, *Diprion hercyniae* (Htg.).—This sawfly was generally less numerous than in 1950. The virus disease continued to be an important control factor. Infected larvae were identified from many widely separated points, particularly in Newfoundland, where the disease has continued to spread from points of introduction. It is significant that this disease is capable of maintaining its virulence at low population levels. Smaller numbers of parasites were recovered in 1951.

	Reports	Collections	Larvae per Tree Sample	
			Av.	Dev. from 1950
New Brunswick	2	207	0·6	0
Nova Scotia	2	120	1·6	−0·5
Prince Edward Island	—	5	0·3	−0·5
Newfoundland	—	25	0·9	+0·2

Miscellaneous.—The Birch Leaf-Mining Sawfly, *Phyllotoma nemorata* Fall., was numerous on white birch trees in the Fredericton area. This was the first time the insect has been encountered in New Brunswick or Nova Scotia for several years.

The Birch Leaf Miner, *Fenusa pusilla* (Lep.), caused severe browning of grey birch in many sections of Nova Scotia and New Brunswick.

The Elm Leaf Beetle, *Galerucella xanthomelaena* (Schr.), an introduced insect, caused severe defoliation of elm trees in Milltown, N.B. in 1949. Numbers were greatly reduced in 1950, and the outbreak completely subsided in 1951.

The Pine Leaf Aphid, *Pineus pinifoliae* (Fitch), was more numerous in central New Brunswick than in 1950, but did not kill shoots.

During the course of study of white-pine weevil and blister rust in natural stands of white pine, 87 plots were tallied in Nova Scotia and New Brunswick. L. J. Simpson reported that all stands under 40 years of age showed some weevil injury. The number of trees that had been attacked ranged from 5 per cent to 47 per cent and was considerably less than normally found in pure plantations.

LIST OF CO-OPERATORS

Name	Collections	Reports	Name	Collections	Reports
Adams, M. J.	3		Burns, Leo A.	6	
Albert, Leo.	7	1	Burpee, Elery.	5	
Alcock, Wm. D.	1	1	Burrill, V.	8	
Allain, J. Emile.	1		Butler, H. A.	1	
Allen, R. K.	1				
Arnold, Boyce B.	3		Caines, John L.	4	
Arseneault, Sylvain.	2		Calhoun, Reginald.	2	
Arthurs, C. A.	100	2	Cameron, D.	4	
Atkinson, C. M.	1		Cameron, L.	4	
Audet, Edgar.	2		Campbell, D. H.	2	
			Campbell, E. F.	2	
Balch, R. E.	6	1	Campbell, E. R.	2	
Banks, A. V.	1		Campbell, G. R.	4	1
Barter, G. W.	3		Campbell, J.	2	
Basque, Reginald.	4	1	Campbell, James.	1	
Beattie, J.	2		Campbell, John.	3	
Belanger, Gerard.	4		Card, Garland.	1	
Benoit, Frank.	1		Carroll, Howard.	4	1
Benson, D.		1	Carter, J. L.	2	
Bertin, John.	1		Carter, W. W.	2	
Betts, W.	2		Charlton, James R.	1	
Bishop, B. D.	1		Charron, Patrick.	3	
Bishop, G. R.	4		Cheney, A. A.	3	
Bishop, R. L.	2		Chiasson, Martin.	4	
Black, Don H.	2		Chiasson, Nicholas.	1	
Black, W. F.	2		Chouinard, Ernest.	3	
Blin, C. P.	4		Clancy, E.	2	
Bonenfant, Fred.	3		Clark, Alvin A.	4	
Bonnar, E. H.	4		Clark, F. V.	4	
Bosse, Michel.	2		Clarke, Pius.	16	1
Bouchard, J. Levite.	4		Clements, G.	2	
Bouchard, J. N.	1		Coady, H.	1	
Boudreau, G.	2		Coady, L. J.	183	33
Boutilier, R. J.	3		Colter, Ashley.	1	
Boyde, Stanley.	22		Comeau, J. M.	2	
Brennan, John.	4		Conley, R. R.	1	
Broderick, Gregory.	8		Connell, J. V.	4	
Brophy, J. H.	1		Connors, E.	4	
Brown, A. D.	2		Corey, Nase.	3	
Brown, H. L.	2		Corkum, E. D.	1	
Brown, Lloyd H.	4		Corkum, L. A.	3	
Brown, Stewart.	5		Cormier, E.	3	
Buchanan, A.	1		Cormier, Leo.	4	
Buggie, Arthur.	3		Cormier, Philip.	2	
Bujold, J. Alphe.	1		Couturier, Treffle.	1	

LIST OF CO-OPERATORS—Continued

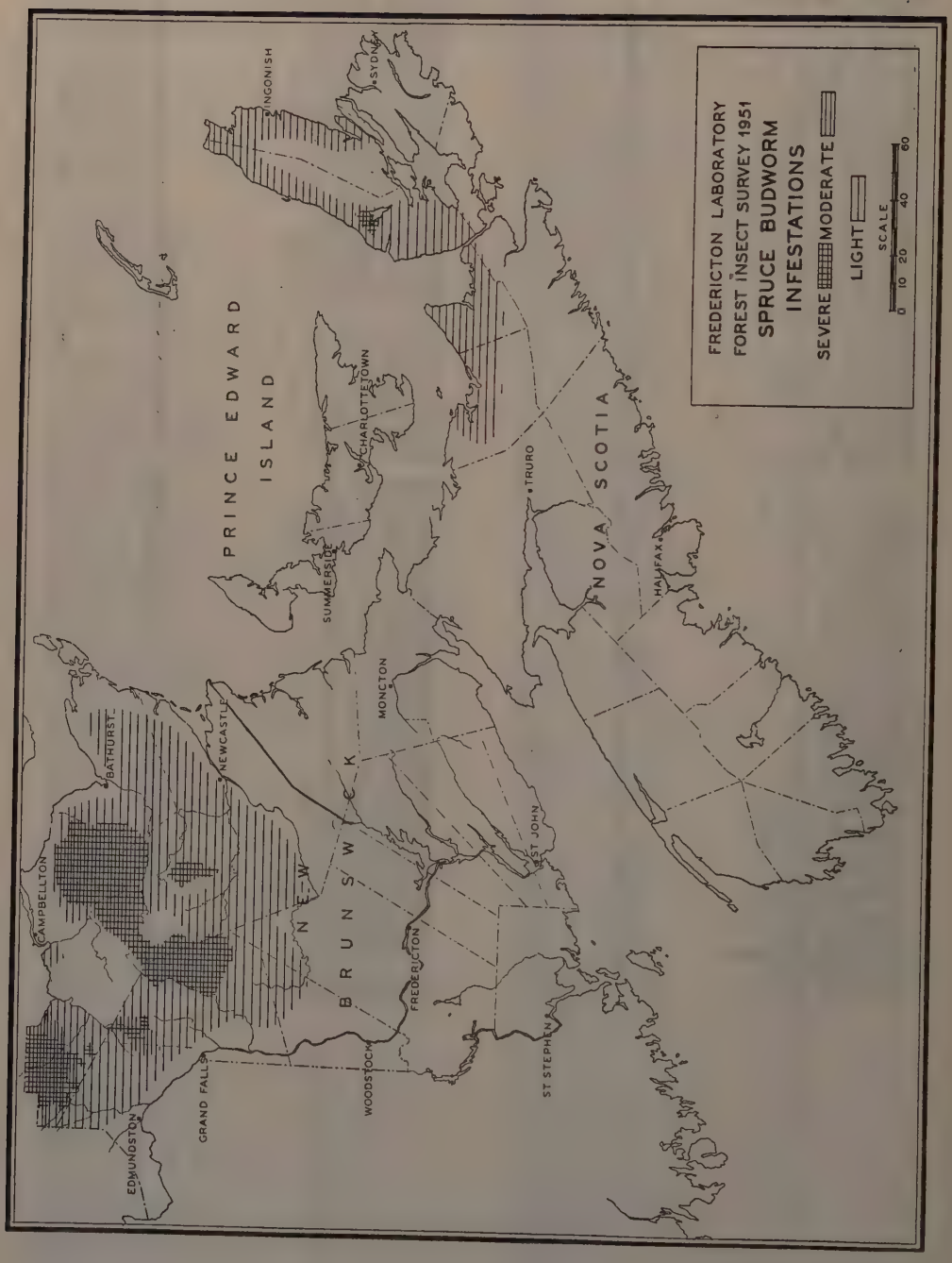
Name	Collections	Reports
Craig, H. A.	4	1
Craig, M. O.	4	
Crawford, G. R.	4	
Crombie, Roy A.	4	1
Crossman, E. C.	6	
Crosthwaite, R. E.	3	
Crowe, A. F.	4	
Crowell, F.	4	
Cruickshank, J.	1	
Culligan, Theo.	4	
Cuming, F. G.	8	20
Curran, S. J.	67	4
Currie, G. H.	3	
Cyr, Claude S.	4	
Cyr, I. A.	1	
Cyr, J. H.	3	
Cyr, Onezime.	2	
Cyr, Rene.	4	
Daigle, J. L.	5	
Daigle, Victor.	4	
Daley, Carson.	1	
Daley, Joseph.	2	
Dauphinee, R.	2	
Davidson, W. R.	1	
Dawson, Edgar.	4	
Day, Baxter.	51	
DeLong, G. M.	4	
Demond, S. A.	1	
Demont, F.	4	
Dempsey, Albert P.	1	
Desjardins, Philippe.	3	
Despres, C. F.	4	1
Deveau, A.	1	
DeWolfe, Chas. T.	4	
Diamond, W. R.	2	
Dick, J. Clarke.	4	
Dickie, Edward.	1	
Dicks, E.	22	
Doherty, C.	2	
Donovan, H. J.	4	
Donovan, W. L.	4	
Drapeau, J.	2	
Drinkwater, M.	4	
Dryden, Robt. J.	2	
Dube, Adrian, A.	3	
Dugas, Rene.	4	1
Duguay, J.	2	
Duncan, D. P.	2	
Dunnett, Wm. J.	4	
Dunster, A. T.	4	
Duthie, A. B.	4	
Duthie, Lawrence W.	3	
Dwyer, D.	1	
Dwyer, Gregory.	5	
Edmond, Joseph.	3	
Ellis, D. G.	2	1
Embree, D. G.	3	
English, Earl J.	1	
Esliger, Fabien.	1	
Essensa, Gardiner.	4	
Estey, Herbert.	1	
Estey, R. L.	2	
Fairweather, W. A.	6	
Farquhar, J. E.	5	
Farquharson, J.	5	
Felton, S.	2	
Flanagan, J.	1	
Fletcher, B. J.	1	
Fletcher, R. J.	3	
Flinn, H. R.	3	
Foley, Patrick.	4	
Forbes, R. S.	41	
Forcey, Oswald.	3	
Forsyth, G.	1	
Forsythe, James.	1	
Foster, Beecher R.	4	
Foster, G. K.	3	
Fowler, R.	3	
Fraser, A. T.	1	
Fraser, K. A.	52	9
Frost, John.	9	
Frost, R.	3	
Frenette, Thos.	2	
Fulton, E.	1	
Fulton, Fred.	3	
Furlotte, J. Ernest.	1	
Gagnon, Adelard.	3	
Gallant, Theodore.	4	
Gerard, Ronald.	5	
Gilks, Harold.	4	
Gilbert, O. S.	4	1
Gillespie, H. J.	3	
Gillis, L.	3	
Godin, Frank.	2	
Godin, J. E.	1	
Good, Martin K.	4	
Grainger, P. N.	6	
Grant, Fred R.	2	
Grant, H. J. A.	1	
Granville, C.	15	
Green, H. G.	2	1
Greening, Kenneth.	5	
Greening, Thos. H.	5	
Grey, Chas. O.	1	
Hache, Joseph.	2	
Hache, Pierre J. D.	4	
Hallahan, Gordon.	4	
Hannon, John.	3	
Hancock, G.	14	
Harrington, W.	187	33
Harris, R.	3	
Harrison, Alfred W.	3	1
Haslam, Fred.	2	
Hawboldt, L. S.	1	
Hayes, E. V.	2	
Hebert, A. J.	2	
Hebert, Fred.	3	
Henderson, Robt. E.	1	
Henry, Henry P.	2	1
Henry, Norman J.	2	
Hill, A. G.	18	2
Hingley, A.	4	
Hollier, Ernest.	4	
Horsman, Alan A.	3	
Howard, G. M.	1	
Huard, John.	3	
Hubbard, W. E.	5	
Huggan, M.	2	
Hunter, A. W.	4	
Hunter, J. E.	4	1

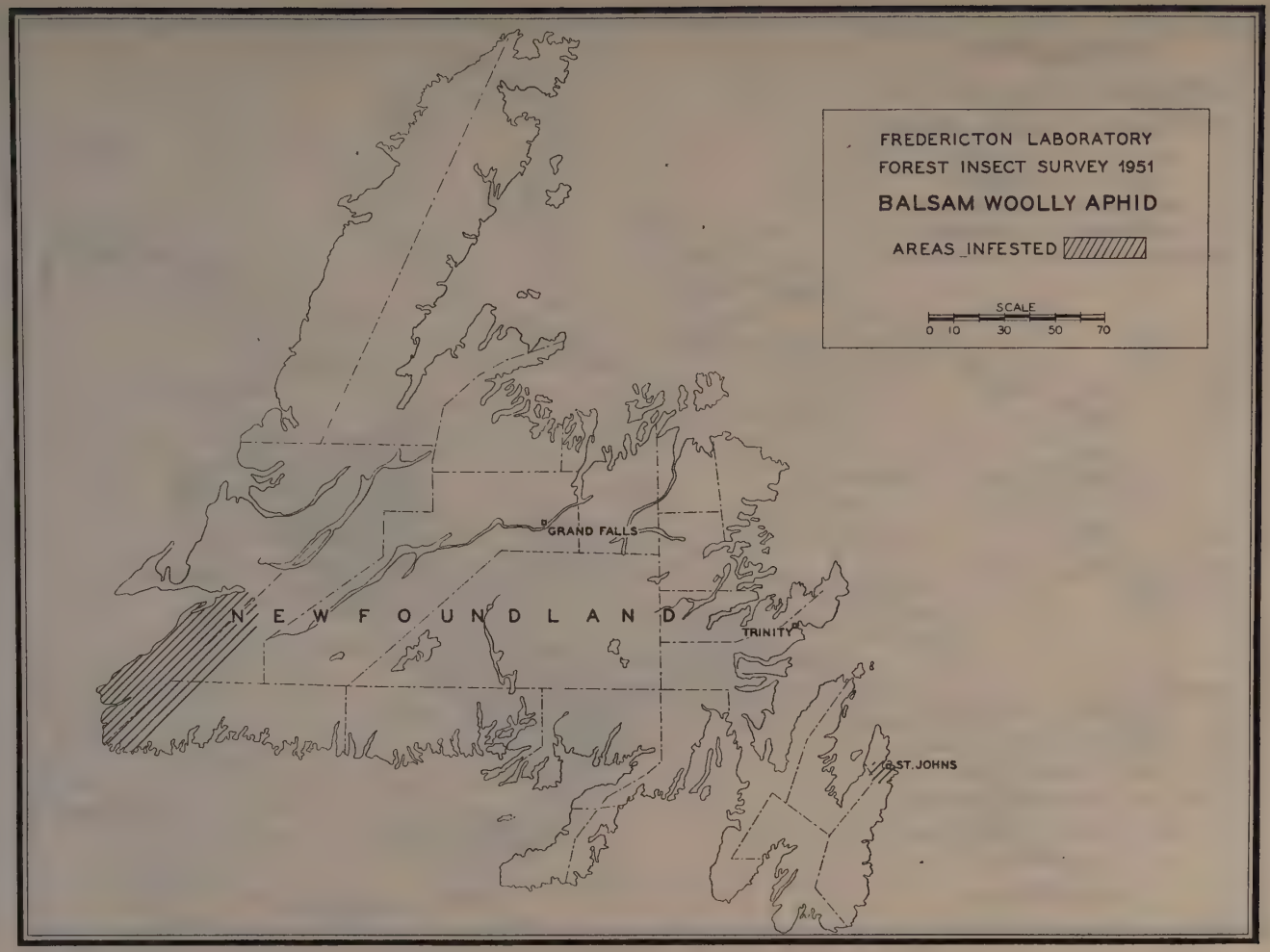
LIST OF CO-OPERATORS—Continued

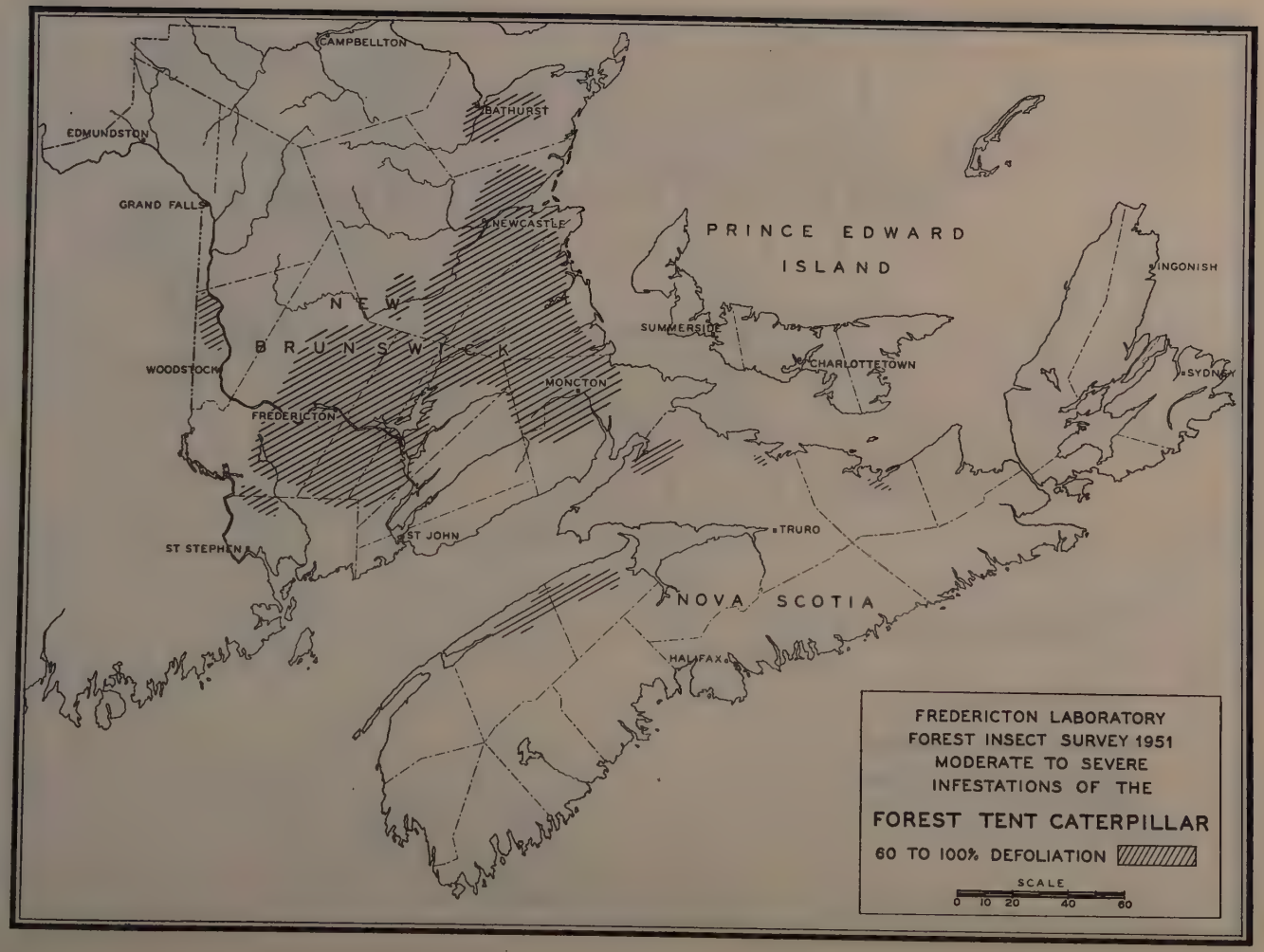
Name	Collections	Reports
Ivey, Raymond	3	
James, L. H	10	
Jefferson, S	1	
Johnson, Clarence	4	
Johnson, John	3	
Johnson, Roy	2	
Johnson, R. S	1	5
Johnston, G. J	1	
Kane, John	3	
Kennedy, R	4	1
King, J. B	1	
Kingston, L. L	4	
Kirby, H	2	
Knowles, Thos	1	
Lambert, H. M	4	
Landry, J	7	
Lane, Arthur E	4	
Lancaster, Ken	4	
Lapointe, Emile	3	
Lavoie, J. Baptiste	2	
Lavoie, Leon	4	
Lawson, LaFay M	3	1
Lebans, E. R	4	
LeBlanc, Ambrose	2	
LeBlanc, Edward I	3	
LeBouthillier, Joseph	3	
Leclair, Levite	3	
Legere, Isaac	4	
Letcher, A. W	8	
Levasseur, Ronald	1	
Levesque, Adelard	2	
Lewis, J. F	2	
Lizotte, Edmond	2	
Lockhart, H. L	3	
Lounder, H. D	4	
Lyons, Alvin H	3	
Macaulay, M. J	2	
Mailman, F	2	
Mann, Arnold	3	
Mallet, Firmin	1	
Marchand, A	3	
Marks, D. B	6	22
Martin, Romeo	2	
Masson, G. H	4	
Matthews, G. W	2	
Melanson, Ted	8	
Meunier, Y	2	
Michaud, F. A	4	
Michaud, George G	2	
Millard, H. W	1	
Montgomery, F. W	2	
Moore, Murray	4	
Moran, G. V	95	44
Morehouse, R. E	7	
Morehouse, W. E	4	
Morgan, C	2	
Morneault, Yvon	4	
Morris, Clyde	4	
Morrison, J. M	1	
Morton, J. F	3	
Mullaly, Vincent	3	
Mullin, C. A	3	
Mullin, Leo	1	
Murray, A. C	2	1
Murray, H. T. C	4	1
Myles, Enos	4	
MacBeath, David	2	
MacCabe, R. T	1	1
MacCallum, J. E	15	2
MacDonald, D	2	
MacDonald, Freeman	7	
MacDonald, J. A	3	
MacDonald, T. J	1	
MacGillivray, H. G	10	
MacKinnon, D	1	
MacLagan, Peter	7	1
MacLellan, J	1	
MacLeod, D. R	5	
MacPherson, Alex	4	
MacPherson, L	4	
MacWhirter, W. B	2	
McAllister, H. F	2	
McAloon. Henry	3	
McBride, G. J	5	
McCarron, M. J	1	
McChesney, G	5	
McDougal, H. V	3	
McFarland, C. W. A.	3	
McGlinchey, D. A	1	
McKay, James	4	
McKinley, N. R	3	
McKinnon, Alex A	1	
McKinnon, C. C	2	
McLaughlin, Milford.	4	
McLeod, J. M	4	
Nadeau, Daniel	3	
Nichol, A. F	2	
Nickerson, D. E	2	
O'Donnell, Fraser	2	
O'Donnell, G. G	2	
O'Leary, H. A	5	
Ouellet, Ludger	2	
Page, C	3	
Palmer, Harry	3	
Pardy, William	2	
Parker, W. E	2	
Parlee, Alfred	2	
Parrott, W. C	53	3
Paterson, Milton	1	
Patterson, C. G	4	
Pelletier, Levite	3	
Pelletier, Prudent	4	
Pelletier, Pierre A	2	
Pelletier, T. J	3	
Perry, J. R	4	1
Perry, W. A	2	
Phillips, Pembroke	2	
Pickle, F. L	1	
Place, I. C. M	1	
Poirier, Elie	8	
Poirier, Etienne	1	
Poirier, Pierce	2	
Poirier, T	2	
Porter, G. A	3	
Power, E. R	3	
Powers, G	2	
Price, David H	5	
Price, Henry	8	
Price, W. J	5	
Prosser, Elmer	2	

LIST OF CO-OPERATORS—Concluded

Name	Collections	Reports
Raiche, W. J.	1	1
Ralph, Edmund	15	
Read, D. C.	8	1
Redmond, D. R.	2	
Reeks, W. A.	25	6
Reid, James	2	
Reid, John A.	1	
Richard, L. G.	3	
Richard, R. J.	2	
Richardson, John P.	1	
Ricketson, C. L.	1	
Ricketts, Herbert	2	
Rideout, D.	1	
Rideout, Pierce	4	
Roach, J. W.	2	
Robichaud, Cyril	2	
Robinson, W. G.	11	1
Rogers, John	3	
Ronsell, August	1	
Roussel, Roger	2	
Rowan, Leo H.	2	
Rowe, Wm.	9	1
Roy, Theo. L.	2	
Russell, Myles D.	3	2
Savoie, Willie L.	2	
Savoy, J. C.	3	
Savoy, W. J.	1	
Sawler, P.	4	
Scott, U.	1	
Seaton, J. H.	65	5
Selvet, M. J.	2	
Seymour, J. R.	4	
Shears, Dudley	48	
Shepherd, V. P.	4	1
Silver, G. T.	10	3
Sloan, H. E.	4	
Smith, C. C.	2	20
Smith, K. G.	2	
Snider, M.	1	
Sparkes, Calvin	1	
Spencer, Herbert	3	1
Steeves, Karl C.	1	
Stevens, A.	1	
Stevenson, A. G.	2	
Stewart, G. P.	10	4
Stuckless, F.	13	
Sutherland, Walter	1	
Swansburg, G.	3	
Swim, C. W.	4	
Tayes, C. M.	4	
Taylor, W.	1	
Taylor, W. C.	1	
Taylor, Watson	3	
Teahan, Ronald	1	
Theriault, Arthur V.	2	1
Thibault, Armand	1	
Thibault, J. E.	3	
Thibodeau, Leo	4	
Thomas, D. A.	8	3
Thomas, R. W.	4	
Thomas, Wm.	3	
Thompson, Acey	23	
Tozer, Budrow S.	14	
Tozer, Stillman	4	
Trueman, N. M.	4	
Underwood, G. R.	17	4
Urquhart, D.	2	
VanHorne, G. I.	3	
Vautour, A. J.	2	
Vickery, V. R.	3	
Vye, William	1	
Wagstaff, B.	3	
Wallace, W. J.	2	
Walsh, Kenneth	1	
Walsh, William	1	
Waycott, M. J. B.	4	
Wear, H.	2	
Webber, W.	1	
Wentzell, S.	3	
Whalen, J. M.	2	
Whalen, R.	1	
White, H. J.	1	
White, Ross	2	
Whitman, C. F.	3	
Wile, D.	4	
Wile, G.	1	
Williams, L. E.	105	6
Wilson, Frank B.	4	
Wilson, H. A.	4	
Winters, J.	2	1
Wiseman, W.	1	
Woodcock, C. A.	4	
Wooden, J. O.	4	
Woods, J. E.	1	
Wright, H. G.	7	
Miscellaneous	5	105


FREDERICTON LABORATORY
FOREST INSECT SURVEY 1951
SPRUCE BUDWORM
INFESTATIONS
SEVERE
MODERATE
LIGHT
SCALE
0 10 20 40 60
PRINCE EDWARD ISLAND
NOVA SCOTIA
NEW BRUNSWICK
CAMPBELLTON
BATHURST
NEWCASTLE
MONCTON
SUMMERSIDE
CHARLOTTETOWN
PORT AUX BASQUES
INGONISH
SYDNEY
TRURO
HALIFAX
ST JOHN
FREDERICTON
WOODSTOCK
GRAND FALLS
EDMUNDSTON
ST STEPHEN


FREDERICTON LABORATORY
FOREST INSECT SURVEY 1951
BALSAM WOOLLY APHID
AREAS INFESTED
SCALE
0 10 30 50 70
GRAND FALLS
NEWFOUNDLAND
TRINITY
ST. JOHNS


CAMPBELLTON
BATHURST
EDMUNDSTON
GRAND FALLS
NEWCASTLE
PRINCE EDWARD
ISLAND
INGONISH
N E W
B R U N S W I C K
SUMMERSIDE
CHARLOTTETOWN
SYDNEY
WOODSTOCK
MONCTON
FREDERICTON
ST JOHN
TRURO
ST STEPHEN
NOVA SCOTIA
HALIFAX
FREDERICTON LABORATORY
FOREST INSECT SURVEY 1951
MODERATE TO SEVERE
INFESTATIONS OF THE
FOREST TENT CATERPILLAR
60 TO 100% DEFOLIATION
SCALE
0 10 20 40 60


CAMPBELLTON
BATHURST
EDMUNDSTON
GRAND FALLS
NEWCASTLE
PRINCE EDWARD
ISLAND
INGONISH
N E W
B R U N S W I C K
SUMMERSIDE
CHARLOTTETOWN
SYDNEY
WOODSTOCK
MONCTON
FREDERICTON
TRURO
ST. JOHN
ST. STEPHEN
NOVA SCOTIA
HALIFAX
FREDERICTON LABORATORY
FOREST INSECT SURVEY 1951
INFESTATIONS OF THE
EUROPEAN WINTER MOTH
SEVERE
MODERATE
LIGHT
SCALE
0 10 20 40 60

PROVINCE OF QUEBEC

LIONEL DAVIAULT

Bureau of Entomology, Protection Service, Department of Lands and Forests, Quebec

INTRODUCTION

The 1951 season was characterized by rather low temperatures which persisted up to September, and by more precipitation than for several years past. These weather conditions were particularly favourable for the production of an abundance of foliage on both conifers and hardwoods, and largely mitigated the injury caused by some pests that had been particularly severe in recent years.

In 1951, 4,608 collections of insects were made by 600 co-operators distributed throughout the accessible areas of the Province; this represents a reduction over 1950 of 11·3 per cent in the total number of collectors and 15·6 per cent in the number of samples. The numbers collected by each co-operating organization are as follows: fire rangers and inspectors of the Forest Protection Service, 876; personnel of companies and forest protective associations, 2,848; insect rangers of the Bureau of Entomology, 866.

The distribution of collections according to tree species is as follows:

Coniferous hosts	Collections	Deciduous hosts	Collections
Spruce	1,964	White birch	195
Balsam	1,938	Poplar	97
Jack pine	83	Aspen	86
Larch	62	Yellow birch	12
White pine	16	Maple	33
Red pine	15	Elm	11
Pine, various	18	Mountain ash	13
Cedar	17	Oak	5
Hemlock	5	Miscellaneous	38
	4,118		490

GRAND TOTAL—4,608

The most notable item in the above table is the fact that only 3,902 samples were taken from balsam and spruce in 1951 against 4,591 in 1950; this reduction of 15 per cent is an indication of the relative abundance of the various insects which affected these trees during the last two years.

IMPORTANT INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.).—Each year since the development of the outbreak in Quebec, it was noted that the infestation moved steadily in an easterly direction while the main centres of attack subsided in the old infested areas farther to the west. However, in balancing the gains and losses at the end of each season, there has always been an increase in the degree of attack. For the first time in 12 years, there was an evident reduction in the

virulence of the outbreak in all regions of the Province except in the valley of the Matapedia and in the Gaspe Peninsula. This is indicated in the following table.

Regions	Number of collections			Average number of insects per sample		
	1949	1950	1951	1949	1950	1951
Matagami	17	1	1	2·7	2·0	5·0
Abitibi	87	31	6	12·3	5·7	9·1
Temiscamingue	118	63	8	10·3	8·0	1·0
Ottawa Valley	264	211	52	15·8	10·6	3·5
Montreal North	106	128	108	8·5	4·5	7·5
St. Maurice	309	508	355	19·1	11·3	11·9
Jacques Cartier	244	181	57	14·1	26·5	15·7
Lake St. John	59	69	60	13·2	13·2	12·6
Saguenay	187	259	110	21·9	15·6	15·2
Manicouagan	118	235	133	6·2	17·1	5·8
Romaine	3	14	3	14·6	1·1	4·0
Labrador	1	.....	.....	20·0	.....	.....
Montreal Plain	1	4	2	3·0	1·5	8·5
Quebec Plain	18	11	5	12·2	3·1	3·2
St. Francis	1	6	1	1·0	2·2	1·0
Chaudiere	14	5	1	1·2	1·4	1·0
Plateaus and Plain of South Shore	43	47	29	13·1	4·7	5·6
Plateaus of Rimouski-Matane and Plain of Lower St. Lawrence	34	78	76	9·1	7·8	8·1
Matapedia	20	38	20	2·8	4·7	16·7
Baie des Chaleurs	28	17	7	1·9	3·1	1·4
Gaspe	4	8	22	2·4	2·2	9·8
	1,676	1,914	1,056	14·4	12·6	10·2

The distribution and degree of infestation in the various regions are shown in the accompanying map. A careful study of the table and the map shows that the reduction in the population was particularly evident in the regions west of the St. Maurice and in the Jacques Cartier region farther to the east. In the regions of Abitibi, Temiscamingue and Ottawa, the insect has become scarce almost to the point of disappearance in many areas. All traces of past injury have also disappeared in most of these places following cutting of the most severely infested stands. A large proportion of the trees which had been only partially defoliated, succeeded in putting out new foliage during the last two or three years. In the more severely defoliated stands, however, and where no cutting had been done, the trees continued to decline.

In the St. Maurice region, several centres of very active infestation persist, and severe defoliation was recorded in several places. An evident increase was noted in the numbers of balsam dying as a result of complete defoliation in some areas near La Tuque and northeast of Saint-Michel des Saints.

In the Lake St. John and Saguenay regions, the centres of infestation were also reduced in intensity and area; however, balsam was seriously defoliated in some stands south of Batogville and in Laurentide National Park. In the latter area, a number of balsam had already died as well as at Mars River and at Passe Dangereuse north of the Lake St. John region.

On the south shore of the St. Lawrence, the outbreak increased tremendously in the Matapedia Valley, around Matane, the Madeleine River, and in various localities on the north side of the Gaspe Peninsula. Spectacular flights of moths were reported at Causapscal and Carleton in the Baie des Chaleurs on July 26. Severe defoliation also occurred near Cabano and East Lake in Temiscouata County and along the shore of the St. Lawrence in Kamouraska County on ornamental trees and in woodlots.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.—The outbreak of this insect increased in both area and intensity as was anticipated by the number of egg masses found on twigs of aspen in the preceding fall. In 1951, the insect was found in small numbers throughout the Province, but caused the most severe injury over an immense territory north of the St. Lawrence as shown on the accompanying map. It was possible to define the boundaries fairly accurately as a result of information obtained from the forest insect rangers. The map shows that the main infested area extends from the Ontario boundary on the west, to Laurentide National Park and Lake St. John in the east, with a few foci of lesser importance on the North Shore as far as Forestville; its northern limit corresponds to a wavy line between the 48th and 49th parallels of latitude; to the south, it again meets the St. Lawrence. A few other small centres of infestation were also found on the Bleue River in Temiscouata County and south of the Chaudiere River.

In all regions where the insect was very abundant the aspens were completely stripped of their foliage at the end of June, whilst maple, oak, birch, and wild cherry were defoliated to a lesser degree. In some areas, the insect was extremely numerous and sometimes the wandering caterpillars interfered with highway and rail traffic. Later in the season, spectacular flights of moths were seen, particularly at La Tuque and Quebec. The severe defoliation was especially noticeable early in the season but towards the end of summer, those trees that had lost all their foliage put out new leaves and all traces of the outbreak disappeared. Few trees have been killed to date; but a considerable percentage of aspens which had been completely defoliated in the last two years may perish if the attack persists unabated next year.

An outbreak of such a size as that prevailing at present is due to a variety of circumstances, but arises particularly from the fact that there are vast stands of pure aspen, the preferred host of the forest tent caterpillar. These stands originated, for the most part, on old burns and cut-over lands.

Large Aspen Tortrix, *Archips conflictana* (Wlk.).—In some areas the larvae of this insect increased the injury caused by the preceding species. Samples containing numerous larvae were received from the Bleue River in Temiscouata County, and from Lake Bouteille near Saint-Michel des Saints in the upper St. Maurice. Adults appeared in the insectary in the last week of June. This is apparently the first time that this insect has been reported causing serious defoliation of aspen in Quebec; it is probable, however, that in the past its work has been unnoticed, or mistaken for that of the forest tent caterpillar. At any rate the records of the Survey show a wide distribution of the insect across the entire Province.

European Spruce Sawfly, *Diprion hercyniae* (Htg.)—This sawfly was again very frequently encountered in samples from spruce in all regions of the

Province, as may be seen on referring to the accompanying map and the following table. An examination of the table, however, shows that there was a general reduction in the numbers of the insect in 1951 in all regions except the Ottawa, Plateaus and Plains of the Lower St. Lawrence, and the Gaspe Peninsula. Fairly severe defoliation was seen by an insect ranger in the Abitibi Region, in Clermont Township a few miles north of the La Sarre River. Less serious defoliation was also noted near the villages of La Reine, Magamic, Authier, and Tachereau, where the insect had been reported as being fairly abundant the previous year. A few important collections were also made in Leslie Township, east of Fort Coulonge. As may be seen, there are always a few permanent foci of infestation which, in favourable years, may develop into new outbreaks.

Regions	Number of collections			Average number of insects per sample		
	1949	1950	1951	1949	1950	1951
Matagami	1	3	4	11·0	97·3	29·2
Abitibi	36	28	37	7·9	11·4	4·7
Temiscamingue	56	21	15	4·4	5·0	9·0
Ottawa Valley	56	40	36	5·1	3·4	4·1
Montreal North	55	65	30	4·8	2·6	4·0
St. Maurice	65	83	50	5·8	3·5	2·9
Jacques Cartier	27	8	4	4·9	11·2	1·5
Lake St. John	12	17	6	4·3	2·7	1·8
Saguenay	33	37	17	2·9	3·2	2·2
Manicouagan	75	42	33	2·8	2·5	2·8
Romaine	9	3	2	9·3	10·0	5·7
Montreal Plain	1	1	0	1·0	1·0	0
Quebec Plain	10	5	0	2·5	2·0	0
St. Francis	8	.....	2	11·8	.....	1·0
Chaudiere	6	28	5	3·8	3·1	4·0
Plateaus and Plain of the South Shore	35	34	35	3·7	2·4	3·2
Plateaus of Rimouski-Matane and Plain of the Lower St. Lawrence	107	18	26	3·9	1·8	3·6
Matapedia	16	16	12	3·2	2·6	2·8
Baie des Chaleurs	18	13	8	2·7	1·3	1·7
Gaspe	24	6	11	2·8	4·3	3·0
	650	469	343	4·1	4·1	3·8

Yellow-Headed Spruce Sawfly, *Pikonema alaskensis* (Roh.).—This sawfly is far from being so important in the forest as the preceding species, since its larvae prefer open-grown spruce. It is more destructive in young plantations and on windbreaks and ornamentals. Under favourable conditions, the insect can strip the trees completely or partially of their needles and according to the degree of the defoliation, the trees may die or lose a few branches. In 1951, the insect was more common than usual in nearly all regions of the Province and caused severe defoliation of young spruce at Mont Laurier and Val Barrette, north of Montreal; at Harvey Junction in Portneuf County; at Lake Manouan in the St. Maurice; at Port Alfred in the Lake St. John region; the York River and Mechins in the Gaspe Peninsula; at Seven Islands and northeast of the Moisie River on the North Shore. The accompanying map shows the distribution and intensity of attack. Number of collections, 190; average number of larvae, 7·9.

Spruce Needle Worm, *Dioryctria reniculella* (Grt.).—The accompanying map indicates that this insect was again found in nearly all regions of the Province and the following table also shows that it was much less abundant than in 1950. The largest samples were collected near Grand'Mere; at White Rapids in the

upper St. Maurice; the Watersheds of the Montmorency and Sainte-Anne rivers in the Jacques Cartier region; the Shipshaw River in the Lake St. John region; at La Malbaie, the Laval River near Forestville, and north of Saint-Michel des Saints.

Regions	Number of collections			Average number of insects per sample		
	1949	1950	1951	1949	1950	1951
Matagami	.....	6	2	.....	3·2	1·0
Abitibi	31	7	1	5·7	1·4	1·0
Temiscamingue	17	9	0	1·7	2·0	0
Ottawa Valley	44	29	9	3·3	1·8	1·2
Montreal North	16	15	11	3·2	2·1	3·5
St. Maurice	84	118	62	4·3	4·1	4·1
Jacques Cartier	45	39	16	4·0	4·7	9·3
Lake St. John	14	16	7	2·1	2·7	2·8
Saguenay	43	61	25	7·9	5·4	2·0
Manicouagan	41	77	35	3·3	5·1	2·1
Romaine	1	1	0	2·0	1·0	0
Quebec Plain	2	3	0	5·0	1·7	0
Chaudiere	.....	1	0	.....	1·0	0
Plateaus and Plain of the South Shore	12	19	8	1·7	6·7	2·6
Plateaus of Rimouski-Matane and Plain of the Lower St. Lawrence	6	14	11	10·8	8·9	1·7
Matapedia	1	10	4	1·0	3·0	1·0
Baie des Chaleurs	3	6	0	1·3	1·1	0
Gaspe	1	2	2	1·0	5·0	3·0
	358	433	193	4·3	4·2	3·4

Larch Sawfly, *Pristiphora erichsonii* (Htg.).—This insect was less numerous and was found in only a few places, namely, the neighbourhood of Thurso and Arundel, the Ouareau River, and in the watershed of the St. John River, Romaine region. The latter area was the only one where the insect had been found each season since 1948. Numbers of collections, 8; average number of larvae, 8·3.

Small Larch Sawfly, *Anoplonyx canadensis* Harr.—This sawfly has a wider distribution than the preceding species, but the injury caused by the larvae is insignificant. In 1951, it was particularly abundant south of Lake Cimon, north of Thurso, at lakes Antoine and Saint-Remi, to the west of Saint-Jovite, at the Croche River in the watershed of the St. Maurice and at the Seigneurie of Grande-Riviere in the Gaspe. It was also found, but in smaller numbers, at Malartic, Forsythe and La Reine in Abitibi, at lakes Ouatekiway and Chicoukiki, at Passe Dangereuse in the Lake St. John region, and at the St. John River on the North Shore. Finally, samples containing only a few larvae came from Laniel and Lakes Bouchette and Superieur. Number of collections, 25; average number of larvae 7·0.

Larch Case Bearer, *Coleophora laricella* (Hbn.).—The insect was seen at Lake Papineau in Argenteuil County, in Cox County in the Gaspe region, and at Notre Dame de la Doree in the Lake St. John region.

Black-Headed Budworm, *Acleris variana* (Fern.).—This insect is still scarce and the largest sample was collected in the Ottawa region. Number of collections, 44; average number of larvae, 1·2.

Balsam Fir Sawfly, *Neodiprion abietis* (Harr.).—No important changes in the distribution of this insect were reported. Several large collections were made at Buckingham in the Ottawa Valley, and at Lake Saguay north of Montreal. Number of collections, 68; average number of larvae, 1·9.

Hemlock Looper, *Lambdina fiscellaria fiscellaria* (Guen.).—The accompanying map and following table show the distribution and relative abundance of this insect in the various regions. It will be seen that populations declined again in all regions except in the Plateaus of Rimouski-Matane and Plains of the Lower St. Lawrence. The infestation which began in the Gaspe in 1948 has almost completely disappeared.

Regions	Number of collections			Average number of insects per sample		
	1949	1950	1951	1949	1950	1951
Matagami	5	8	.....	3·0	1·2	.....
Abitibi	29	6	.....	1·7	1·5	.....
Temiscamingue	24	3	6	2·3	1·3	1·2
Ottawa Valley	53	33	19	1·6	1·4	1·4
Montreal North	37	27	13	1·9	1·4	1·4
St. Maurice	40	32	24	1·2	1·3	1·2
Jacques Cartier	26	13	6	1·3	2·9	1·6
Lake St. John	6	5	10	1·0	2·2	1·2
Saguenay	21	18	18	1·5	1·9	1·4
Manicouagan	29	33	8	1·6	1·5	1·8
Romaine	.....	3	.....	.....	4·7	.....
Montreal Plain	3	6	.....	1·0	3·0	.....
Plain of Three Rivers	3	1	.....	13·3	2·0	.....
Quebec Plain	5	5	.....	2·2	1·4	.....
St. Francis	5	3	.....	1·8	3	.....
Chaudiere	13	7	3	1·7	1·4	1·3
Plateaus and Plain of the South Shore	34	17	5	3·0	3·6	1·4
Plateau of Rimouski-Matane and Plain of the Lower St. Lawrence	18	29	30	1·4	2·1	2·9
Matapedia	22	17	10	2·1	3·1	4·5
Baie des Chaleurs	45	21	4	3·6	2·0	1·2
Gaspe	46	17	6	9·7	7·7	1·0
	463	307	162	2·6	2·3	1·8

Swaine's Jack-Pine Sawfly, *Neodiprion swainei* Midd.—The outbreak is declining, although in some areas the population per tree is still fairly high. In 1951, the largest samples containing specimens of this insect were collected at Cadillac in the Abitibi region, at the Chouart River in the upper St. Maurice, in Laurentide National Park, and near Roberval in the Lake St. John region. Number of collections, 14; average number of larvae, 15·3.

Fall Webworm, *Hyphantria textor* (Harr.).—Webs spun by the caterpillars of this moth were noted in the neighbourhood of Lakes Tremblant and Gauvin north of Montreal, to the northeast of Cabonga, and in Clericy Township in the Abitibi region.

Satin Moth, *Stilpnotia salicis* (L.).—The presence of this insect was reported for the first time in the City of Montreal; twenty-five Lombardy poplars at the St. Joseph Oratory were heavily infested with caterpillars. The infestation noticed during 1949 and 1950 in Kamouraska County is subsiding.

Ugly-nest Caterpillar, *Archips cerasivorana* (Fitch).—Wild-cherry trees along the highways in several regions, particularly in the southern part of the Province, were completely covered with the webs spun by the larvae.

Birch Sawfly, *Arge pectoralis* (Leach).—The insect has lost much of its importance and in 1951 its larvae caused serious defoliation of birch in only a few places, namely, La Force in Abitibi, and the Kenogenis River in the Ottawa region. Number of collections, 7; average number of larvae, 55·1.

Mountain-Ash Sawfly, *Pristiphora geniculata* (Htg.).—This insect is now distributed throughout the Province and in 1951, collections of larvae were made in the upper St. Maurice at Windigo and at the Gouin dam, as well as at Dolbeau in the Lake St. John region. Number of collections 9; average number of larvae 43·2.

Elm Sawfly, *Cimbex americana* Leach.—This insect was again very abundant at Dolbeau in the Lake St. John region and was also observed at Lac des Iles in the watershed of the Jacques-Cartier River.

Aspen Blotch Miner, *Lithocolletis tremuloidiella* (Braun.).—This leaf miner seems to have been much more common than in previous years especially in Abitibi and north of Montreal. It was also observed at Lac des Commissaires in the Lake St. John region, and at Franklin on the North Shore. Number of collections 15; average number of larvae, 8·9.

American Poplar Beetle, *Phytodecta americana* Schffr.—Aspen foliage was seriously injured by the larvae of this beetle in various parts of Portneuf County, especially at Lac Castor, at Lac Maudit, and at Miquick; samples containing larvae were received from Clova in Abitibi, from Lac Manouan in the upper St. Maurice, and at the Mars Gate in the Saguenay.

Basswood Looper, *Erannis tiliaria* (Harr.).—The insect was less abundant in 1951. Number of collections, 6; average number of larvae, 3·6.

Red-Humped Maple Worm, *Symmerista leucitys* Frank.—Several maples at Duchesnay and at East Broughton in the Eastern Townships were severely defoliated by the larvae of this species.

LIST OF CO-OPERATORS

Protection Service, Department of Lands and Forests

Abitibi District

Name	Collections	Name	Collections
Bilodeau, Maurice	2	Laroche, Héliodore	8
Caron, Alfred	1	Levasseur, Adélard	2

Temiskaming District

Name	Collections	Name	Collections
Beaumier, Roméo	4	Gauthier, Pierre-Eugène	8
Bédard, Onésime	16	Girard, Amédée	8
Boulé, Ernest	1	Guay, Léopold	12
Brousseau, Alfred	6	Houle, Antoine	1
Carrier, Patrick	11	Jolin, Arthur	8
Chabot, J.-A.	10	Larivière, Alphonse	11
Champoux, Gérard	8	Lecompte, Albert	12
Côté, Hormidas	4	Nadeau, Adrien	8
Desruisseaux, Oscar	8	Proulx, Paul	12
Duchesneau, Palma	12	Rock, Albert	2
Gamelin, Edward	4	Trudel, Napoléon	12
Gauthier, Noé	4	Veillette, Rosaire	2

Gatineau District

Name	Collections	Name	Collections
Carpentier, Noé	4	Perreault, Sid	6
Garneau, Olivier	12	Roy, Honorius	6
Généreux, Francis	12	Sage, Fred	8
Laurin, Ernest	10	Sheppard, Sid	8
Legros, Emile	10	Talbot, René	4
Patry, Henri	4	Vaillancourt, Arthur	4

LIST OF CO-OPERATORS—Continued

Montreal District

Name	Collections	Name	Collections
Beaudin, Jos.	1	Legault, Germain.	11
Boileau, D.	1	Lemieux, Narcisse.	8
Chalifour, Sylvio.	6	Massy, Onésime.	1
Charbonneau, J.-Léo.	6	Ménard, J.-Hilarion.	7
Cloutier, Phil.-A.	8	Modérie, Sylvio.	12
Courtemanche, Lionel.	12	Montreuil, Oscar.	9
Forgues, Elphège.	7	Morin, Jean.	1
Garnier, Josaphat.	3	Ouellette, Josaphat.	8
Jubinville, Delphis.	3	Paquet, Victor.	12
Juneau, Donat.	12	Plante, Mathias.	7
Lacoste, Albert.	1	Riopel, Léonard.	2
Lafortune, Rosaire.	8	Rivest, Rosaire.	6
Lalonde, Bonomie.	3	Samson, Arthur.	13
Lanoie, Ernest.	6		

St. Maurice District

Name	Collections	Name	Collections
Aserof, Jos.	6	Grenon, Adrien.	2
Caron, André.	2	Houde, Benoit.	2
Diamond, Jimmy.	1	Lapointe, Adjutor.	1
Edwardson, Léonard.	16	Martel, W.	1
Fortin, Clément.	2	Meguish, Etienne.	4
Genest, Léopold.	2	Santerre, François.	1

Lake St. John District

Name	Collections	Name	Collections
Allard, Arthur.	3	Lalancette, Armand.	2
Boudreault, F.-X.	10	Lapointe, Adjutor.	2
Boudreault, Léonidas.	10	Lavoie, François.	2
Degagné, Ludger.	10	McNicoll, Philippe.	2
Edmond, Georges.	6	Rioux, Louis.	4
Gagnon, Conrad.	8	Rousseau, Léonidas.	4
Guay, Edgar.	2	Tremblay, Valérien.	10
Hamel.	2	Villeneuve, Armand.	6
Harvey, Joseph.	4	Anonyme.	1

Quebec District

Name	Collections	Name	Collections
Bélanger, Alfred.	5	Germain, Sylva.	9
Bellegarde, Alphonse.	11	Jetté, Ernest.	10
Bolduc, Gérard.	2	Lafrance, Wilfrid.	4
Boutin, Joseph.	1	Pépin, Philippe.	10
Boyd, Jos.	8	Perron, Yvon.	4
Charbonneau, Guy.	8	Picard, Maurice.	12
Cloutier, Albert.	4	Plamondon, Antonio.	4
Desaulniers, Oscar.	3	Savard, Adrien.	3
Desève, T.-E.	6		

Lower St. Lawrence District

Name	Collections	Name	Collections
Bélanger, Camille.	4	Dubé, Charles.	10
Bérubé, Ovide.	10	Ouellet, Camille.	12
Blais, Pascal.	3	Ouellet, Jos.	6
Bouchard, Wilfrid.	8	Pelletier, Hervé.	5
Caron, J.-Baptiste.	2	Pelletier, Rosaire.	8
Desjardins, Louis.	2	Sirois, J.-B.	12
Dubé, Albert.	10	Thibeault, Adélard.	1

LIST OF CO-OPERATORS—Continued

Gaspe District

Name	Collections	Name	Collections
Audet, Théophile	4	Laterreur, J.-B.	1
Berger, Normand	1	Pelletier, Louis	7
Cyr, Wallace	2	Pinault, Alfred	4
Dugas, Aldor	4	Roy, Raymond	2
Foley, J.-John	2	Savage, Willie	3
Fournier, Aurèle	2	Warren, Philippe	5
Gagnon, Fernand	4		

North Shore District

Name	Collections	Name	Collections
Dufour, Georges	5	Labrie, Edgar	1
Girard, Eugène	4		

Laurentide Park District

Name	Collectilns	Name	Collections
Beaudoin, Alphonse	2	Levesque, Laurent	2
Bilocque, Léandre	1	Levesque, J.-Pierre	1
Boissonneault, Camille	4	Picher, Antonin	6
Gagnon, Antonio	1	Poitras, Jos	12
Genest, Rosaire	3	Trépanier, Roland	2
Godbout, Dominique	1	Trudel, Edouard	4
Gravel, J.-Marie	1	Valois, Michel	2

John Breakey Ltd.

Name	Collections	Name	Collections
Breton, Laval	1	Lachance, Jos	8
Cathcart, Walter	1	Miller, Samuel	6
Foley, Honoré	6	Veilleux, Georges	10
Foley, Philippe	6	Wintle, Hubert	6

Brompton Pulp & Paper Co.

Name	Collections
Marcotte, Théo	3

Canada Paper Co.

Name	Collections	Name	Collections
Carrier, William	3	Gravel, R.	2
Gowles, H.-B.	1		

Canadian International Paper Co., Clova

Name	Collections	Name	Collections
Anspack, J.-C.	51	McFarland, George	13
Lavoie, R. P.	1	Montgomery, R. H.	1
L'Ecuyer, L.-P.	22	St-Pierre, Maurice	2
L'Ecuyer, P.-E.	8		

Canadian International Paper Co., Maniwaki

Name	Collections	Name	Collections
Ardis, G. W.	6	Joly, Omer	2
Beaudoin, Robert	5	Keeney, O.	4
Bélec, Léo	1	Lamarche, E.	5
Bell, D. E.	4	Lepine, Robert-G.	19
Casey, A. J.	3	Mantha, Adélard	2
East, G.	4	Milmore, O. S.	6
Guntensperger, J. V.	9	O'Leary, Jacques	20
Heafey, O.	1	Poulin, Benoit	6
Jobb, P. H.	2	Rivest, Rosario	12

LIST OF CO-OPERATORS—Continued

Canadian International Paper Co., Noranda

Name	Collections	Name	Collections
Baril, Fred	2	Genest, Maurice	24
Beaudoin, Paul	12	Lefèbvre, Jérome	12
Bédard, Émilien	6	Longballe, N. B	1
Cloutier, Henri	12	Noury, A	4
Cloutier, Raymond	4	Roy, André	4
Gagnon, Ernest	10	Roy, Wenceslas	10

Canadian International Paper Co., Trois-Rivières

Name	Collections	Name	Collections
Boon, Ernest	9	Lafrenière, Benoit	6
Caron, Régent	10	Lafrenière, Bruno	14
Colbert, Jean-Louis	1	Paquet, Patrick	2
Gelinas, Maurice	1	Rivard, J.-F	3
Hogue, Walter	12		

Consolidated Paper Corporation

Name	Collections	Name	Collections
Cadenhead, E. S	8	Francoeur, Roger	14
Carpentier, Prudent	2	Rosholm, Arne	4
Cossette, M	12	Smith, John	4

E. B. Eddy Co. Ltd.

Name	Collections	Name	Collections
Lemaire, Jean	4	Teasdale, J. A	2
Patry, Jacques	2	Trudel, J.-L	3
Piché, G	2		

Hammermill Paper Co.

Name	Collections	Name	Collections
Carrier, Raoul	2	Gosselin, Robert	18
Fortin, Fernand	4	Harrison, Bernard	4
Fournier, Wilfrid	2	St-Pierre, Marius	10

Lake Megantic Pulp Co.

Name	Collections
Godbout, Fernand	3

Laurentian Forest Protection Association

Name	Collections	Name	Collections
Bacon, Frank	2	Brisson, Jean-Marie	2
Beaudin, Jos	8	Brisson, Léopold	6
Beaudin, Léger	5	Canapé, Thommy	4
Beaulieu, Jos. Henri	25	Cantin, Emilien	4
Bedare, André	2	Chiasson, Alcide	2
Bérubé, Alp	9	Cormier, Léonard	3
Bérubé, Antonio	8	Côté, Adrien	6
Boily, Ernest	5	Côté, Joseph	1
Boivin, Léonidas	4	Coulombe, René	2
Bond, Albert	6	Couture, Alfred	1
Bond, James	5	Couturier, Edouard	4
Bond, Joseph	6	Delair, M. A	1
Bond, Nicolas	1	Derosbil, D	1
Bouchard, Donat	4	Deroy, Pierre	4
Bouchard, Ovide	7	Dominique, Léonce	7
Bouchard, Paul	5	Ducas, Pierre-Anguste	2
Boudreault, Evrade	5	Dufour, Albert	16
Boulianne, Antoine	7	Dufour, Antoine	2
Bourque, Patrick	4	Dugas, Marcel	11

LIST OF CO-OPERATORS—Continued

Laurentian Forest Protection Association—Continued

Name	Collections	Name	Collections
Fortin, André	4	Moisan, Robert	4
Fortin, Pierre	6	Otis, Laurent	4
Gagné, Armand	6	Porlier, Norbert	10
Gagné, Jos	4	Poulin, A	1
Gagnon, Alfred	6	Quinn, Aurèle	2
Gagnon, Jean-Charles	4	Renaud, Alexandre	26
Gaudreault, Etienne	6	Robichaud, Jimmy	9
Gilbert, Jean-Charles	8	Roch, Jos	2
Girard, Alphonse	6	Rousseau, Léonard	2
Girard, Michel	6	Savard, Charles	1
Girard, Normand	4	Sénéchal, Yvan	2
Girard, Paul-Emile	2	Simard, Edmond	5
Girard, Ulysse	6	St-Jarre, Roland	8
Godin, Jules	7	Thomas, Joseph	1
Harvey, Raymond	12	Tremblay, Albertus	1
Harvieux, Bastien	2	Tremblay, Alfred	17
Labbé, Joachim	4	Tremblay, Arthur	2
Labbé, Joseph-Etienne	8	Tremblay, Camille	8
Langevin, Pierre J	2	Tremblay, Gabriel	12
Larouche, Oscar	10	Tremblay, Gérard	2
Lepage, Maurice	22	Tremblay, Josaphat	8
Levac, Alex	2	Tremblay, Léo	9
Levesque, Georges	13	Tremblay, Roger	15
Levesque, Roland	7	Tremblay, Victorin	6
Lucien, Gilles	9	Trudel, G. Etienne	2
Mahard, Charles	14	Trudel, Pierre	4
Mahard, Moïse	5	Vallée, Jean-Baptiste	2
Maltais, J. A	6	Vibert, Georges	11
Mansour, Paul-E	1	Vibert, William	9
Marcotte, Antonio	5	Volant, Barthélémy	2
Matte, Jos	4	Ward, Patrick	2
Matte, Paul-Emile	12		

James MacLaren Co. Ltd.

Name	Collections	Name	Collections
Bastien, Léopold	11	Pelneault, Edgar	9
Bohémier, Ben	7	Pelneault, Emery	10
Boucher, M	8	Pelneault, Raymond	1
Dassylva, Thomas	3	Pilote, Germain	10
Gagnon, Richard	1	Plante, Anatole	2
Landry, Gabriel	6	Poudrier, Hervé	9
Laroche, Fernand	6	Prévost, Horace	9
Lavallée, Henri	12	Prévost, Magella	6
Lavallée, Zéphirin	14	Raymond, Maurice	10
Levesque, Fernand	2	Roy, Fernand	5
Morin, Damien	6	Sansfaçon, Roger	6
Morin, Ernest	11	Sigoin, Odilon	7
Ouellette, Ghislain	9	Taillefer, Jean	10
Paiement, Wilfrid	9		

Ottawa River Forest Protective Association

Name	Collections	Name	Collections
Amyotte, Paul	8	Henri, Jos	2
Beaudoin, Robert	3	Jalaboie, Dave	3
Busque, Paul	12	Jerome, Omer	2
Carther, W	2	Kelley, Daniel	5
Cassidy, Frank	3	Keyes, Reginald	2
Cère, Jean	2	King, Fred	2
Chambers, William	2	Ladouceur, Ernest	2
Clark, William	5	Lance, W	2
Coleman, David J	4	Landriault, Alphonse	2
Corrigan, Fred	3	Lavoie, Antonio	1
Derouin, Victor	6	Leguerrier, Ed	1
Dufoe, Hillard	4	Mackey, John	1
Duranceau, Real	10	Massey, Jos	1
Ferrigan, L	6	McHenry, James	2

LIST OF CO-OPERATORS—Continued

Ottawa River Forest Protective Association—Continued

Name	Collections	Name	Collections
Nadeau, E.	1	Provost, Euclide	1
Nadon, Fred	5	Racine, Aldège	3
Navion, Georges	5	Racine, Arthur	2
O'Bomsawin, Geo.	1	Rivet, Antoine	4
Ouellette, Alfred	6	Ross, John	2
Paré, René	2	Ryan, Geo. O	3
Paul, Sam	1	Shea, Gérald	2
Petremont, J.	4	Tabisco, Cota	3
Plassoth, James	1	Tosh, W. C.	2
Polson, Wallace	6	Tucker, H. S.	2
Proulx, J. A.	8	Welley, J. W.	1

Price Brothers Forest Protective Association

Name	Collections	Name	Collections
Allard, H.	2	Lauzier, Richard	12
Berg, A. F.	1	Lavoie, J. Ligouri	12
Bolton, D. M.	1	Lavoie, R.	12
Bouchard, Gérard	2	Lechasseur, Aurèle	12
Bouchard, Ovila	8	Lefrançois, Arthur	10
Boudreault, Victor	16	Lepage, Rosaire	12
Bouillon, Chs.-Eugène	12	Lepang, Arthur	4
Briand, Jean-Paul	10	Lepang, Jacques	2
Chasseur, Xavier	12	Lepang, Sinaï	10
Coque, Rosaire	2	Maltais, Emile	8
Côté, Léopold	12	Mercure, Charles	1
Could, Benoit	2	Ouellet, Armand	12
Deschênes, Eustache	6	Ouellet, Ernest	12
Desjardins, Roger	1	Ouellet, Geo.	28
Donavan, Edmond	2	Paquet, Rosaire	8
Flion, Robert	12	Paquet, Théodore	11
Fournier, Albert	12	Perron, Antonio	12
Gagné, Rosaire	2	Potvin, Arthur	12
Girard, Benoit	4	Rousseau, A.	12
Girard, Georges-Emile	4	Roy, Athanase	12
Guérin, Gérard	12	Simard, M. H.	4
Harvey, Louis-O.	16	Sirois, Jos.	10
Houde, Laurent	5	St-Pierre, Antonio	11
Houde, Sonislas	44	Tremblay, Jean-Th.	12
Imbeault, Pierre	8	Villeneuve, Charles	15
Labbé, Joseph	1	Anonyme	1

Singer Manufacturing Co.

Name	Collections	Name	Collections
Dumas, Roger	4	Teske, Donald, A.	4
Levesque, Victor	8		

Southern St. Lawrence Forest Protection Association

Name	Collections	Name	Collections
Babin, Gildas	2	Donavan, Edmond	8
Beaulieu, Jean	4	Edmond, Delphis	2
Bond, Aurèle	3	Fortin, Laurent	12
Boudreau, Yvon	13	Gagnon, Fernand	2
Brulé, J. D.	1	Gagnon, Victor	1
Bujold, Joseph	2	Gaulin, Lucien	8
Campbell, André	4	Grant, Damien	5
Caron, Gérard	6	Guérette, Armand	7
Chalmers, Thomas	14	Guillemette, Bernard	1
Clarck, Preston	8	Hervey, Adams	1
Cormier, Hector	12	Hervey, James	2
Coull, Gordon	24	Joncas, Oscar	6
Cyr, Antoine	4	Lacasse, J.-Bte	12
Cyr, Edgar	8	Landry, Adrien	3
Deschênes, Alexis	12	Langlois, Ph.	2

LIST OF CO-OPERATORS—Continued

Southern St. Lawrence Forest Protection Association—Continued

Name	Collections	Name	Collections
Lapointe, Amédée	8	O'Leary, James	4
Leblanc, Elias	12	Ouellet, Arsène	2
Leblanc, Jos	6	Ouellet, Georges	5
Lemelin, Léo	6	Patterson, Jerry	4
Lever, Jean-Louis	2	Pelletier, Ernest	6
Levesque, Gabriel	8	Pelletier, Irénée	2
Michaud, Esdras	5	Robertson, John	10
Michaud, Geo.-Henri	3	Rousseau, Louis	4
Michaud, Moïse	3	Roy, Augustin	2
Miller, Georges	2	Ruel, Edgar	1
Minville, Amable	4	Savard, Charles	4
Minville, Antoine	1	Sénécal, Johny	7
Minville, Chs. E	1	Tapp, Antoine	2

St. Maurice Forest Protective Association

Name	Collections	Name	Collections
Allard, Jean-Marie	2	Lajoie, Lucien	2
Asselin, Léo	6	Laforest, L	4
Auclair, Gustave	2	Larouche, Lauréat	2
Awashish, Malek	5	Lasalle, Ernest	4
Baillargeon, Yvon	2	Marier, Henri	11
Beaudoin, Henry	2	Milot, Jean-Charles	4
Béland, Martial	36	Morand, Henri	16
Blouin, Gérard	8	Neault, Rodolphe	2
Boily, Clovis	2	Nielly, Eugène	18
Brulé, Arthur	14	Paquet, René	16
Clermont, Lucien	8	Pellerin, André	9
Cossette, Jean-Louis	6	Pettiqui, Donat	2
Cossette, Wellie	2	Picard, J.-B	4
Coutu, Donat	10	Plante, Emilien	16
Daigle, Wilfrid	10	Plante, Lucien	3
Dallaire, Pascal	8	Plante, Walter	4
Dugré, André	2	Poitras, Ray	8
Duval, Léo	4	Poulin, M	2
Fay, William G	22	Proteau, Germain	2
Ferland, Emilien	20	Proteau, Jacob	36
Fortin, Rolad	22	Provencher, Jean	23
Gagné, Henri	10	Provost, Gaston	4
Gauvin, Roger	6	Rivest, Adélard	14
Gélinas, Aurèle	2	Rivest, Théodore	8
Gélinas, Lionel	9	Sénéchal, Joseph	2
Gélinas, Maurice	6	St-Georges, Emilien	4
Germain, Jean-Louis	4	St-Pierre, Marcel	2
Girard, L	2	Tellier, Alphérie	2
Gouger, Léo	6	Tremblay, Ls.-Georges	2
Goulet, Donat	26	Tremblay, Wilbrod	18
Guérin, René	2	Trudel, Jean-Marie	23
Hébert, Adrien	2	Turcotte, Raoul	2
Hervey, Jean-Louis	4	Turgeon, Roland	2

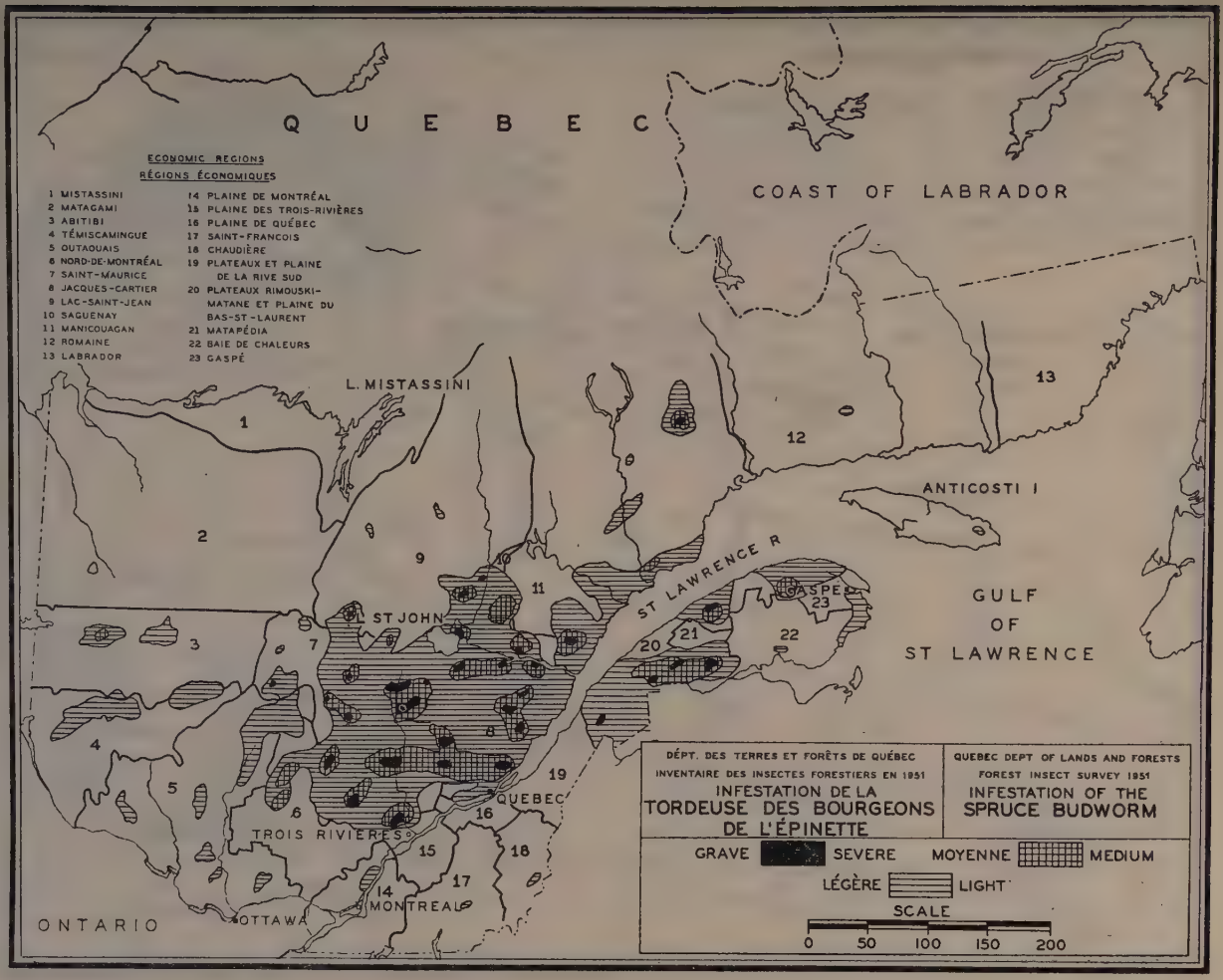
St. Lawrence Paper Mills Co. Ltd.

Name	Collections
Rousseau, Louis	2

Shawinigan Water-Power

Name	Collections	Name	Collections
Bellemare, Côme	8	Crissinger, H.-L.	13

Miscellaneous	18
Bureau of Entomology	866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INFESTATION DE LA TORDEUSE DES BOURGEONS DE L'ÉPINETTE
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FOREST INSECT SURVEY 1951
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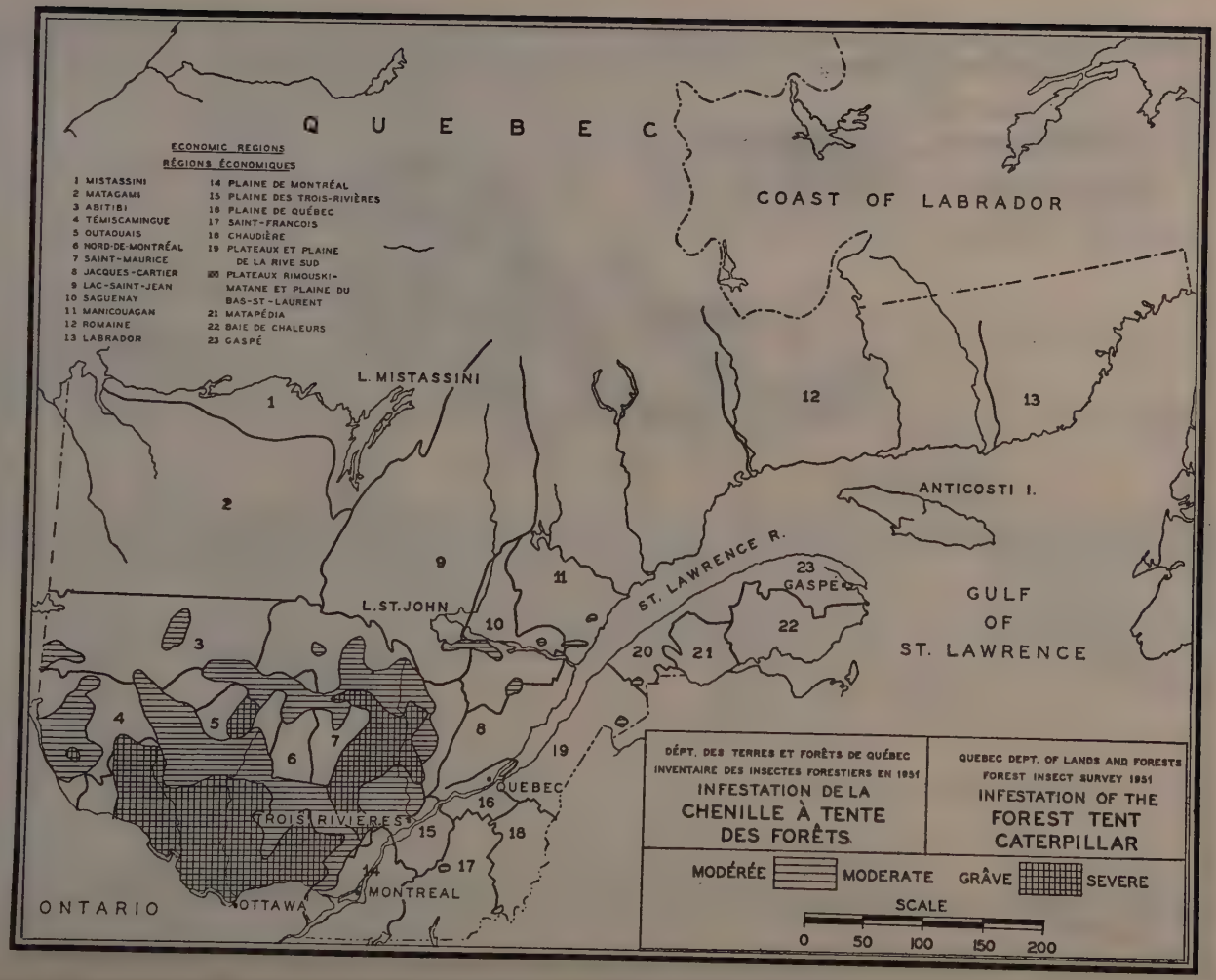
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INFESTATION DE LA CHENILLE À TENTE DES FORÊTS
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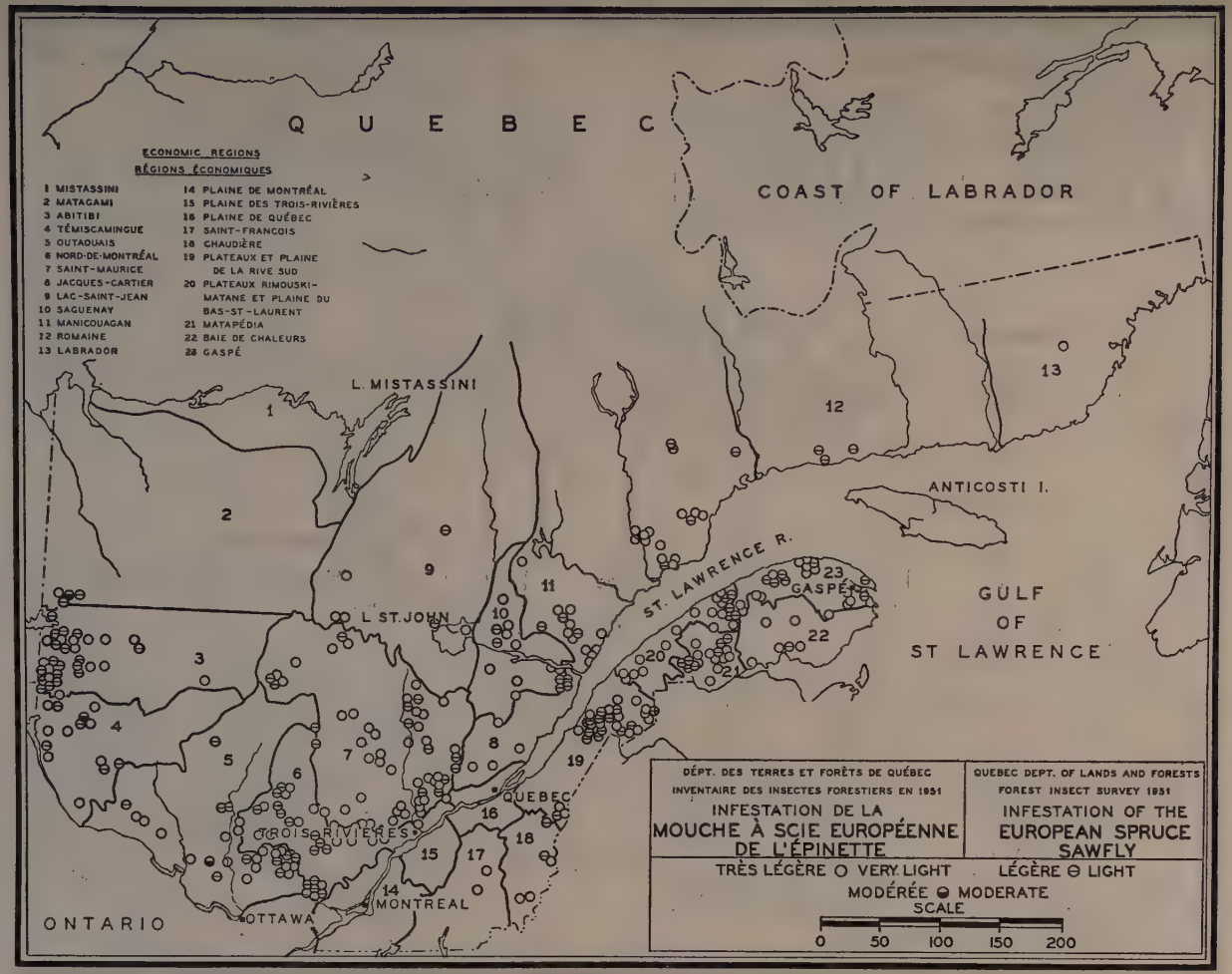
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FOREST INSECT SURVEY 1951
INFESTATION OF THE EUROPEAN SPRUCE SAWFLY
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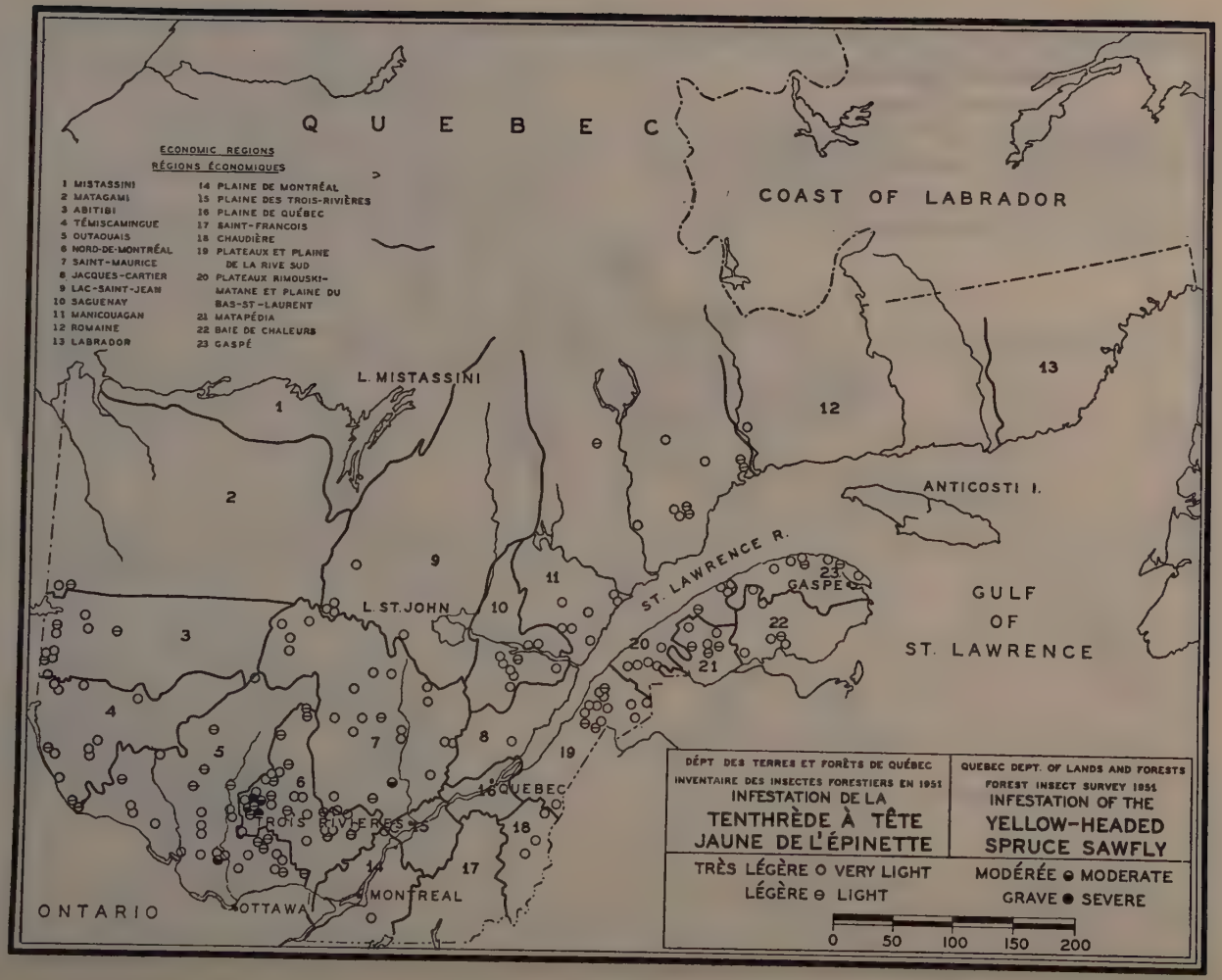
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FOREST INSECT SURVEY 1951
INFESTATION OF THE
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MODÉRÉE ⊜ MODERATE
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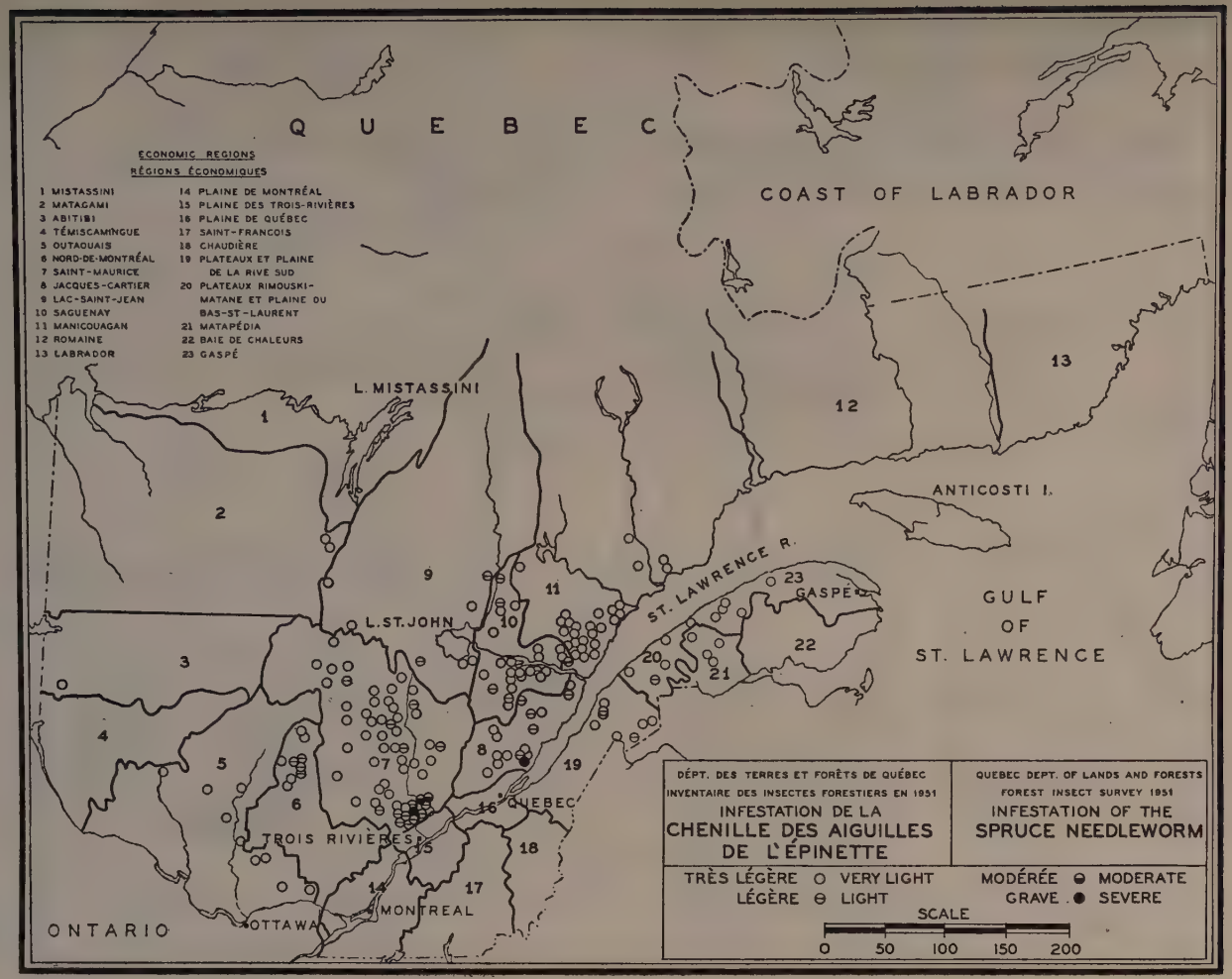
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INFESTATION OF THE SPRUCE NEEDLEWORM
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MODÉRÉE ⊖ MODERATE
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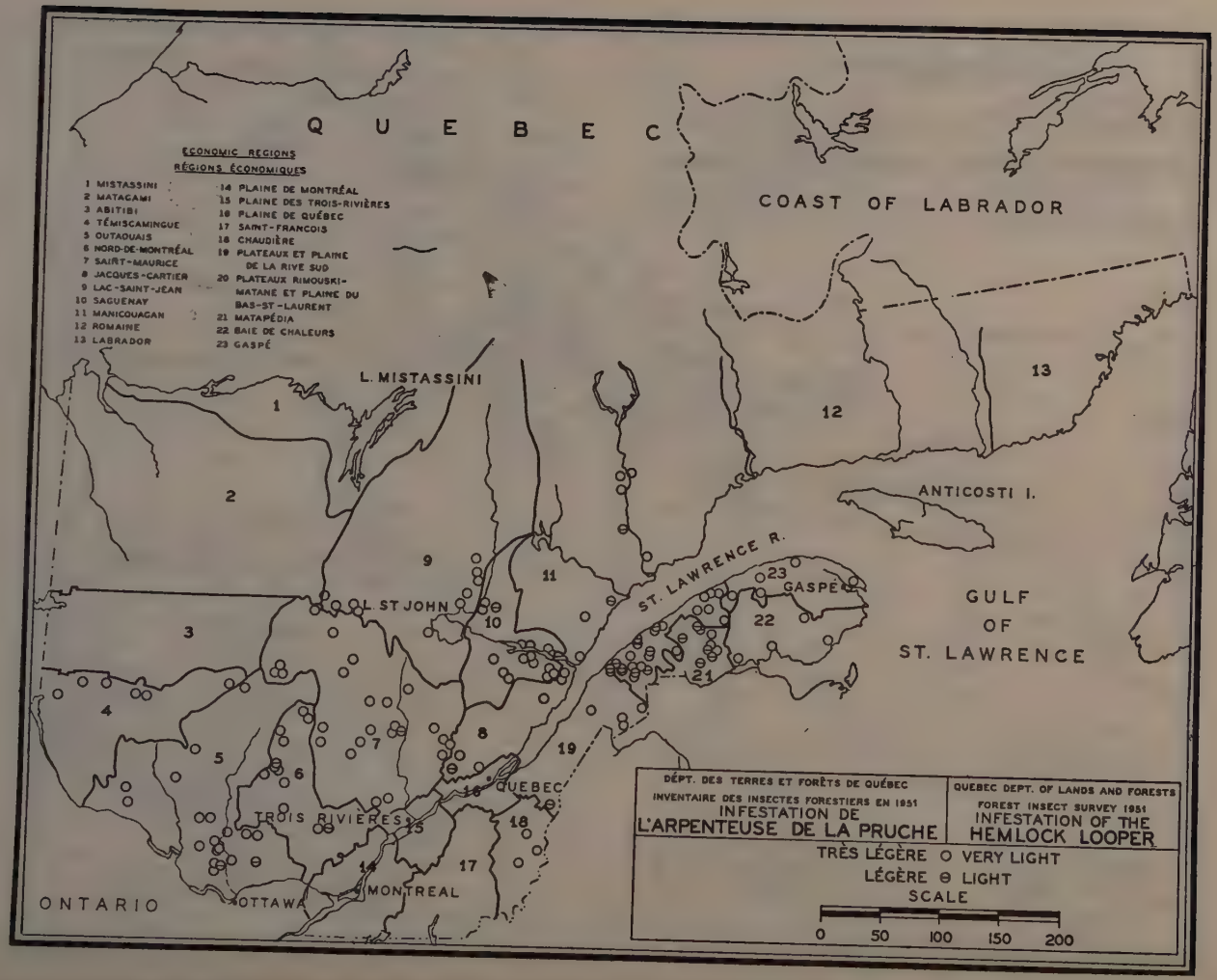
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FOREST INSECT SURVEY 1951
INFESTATION OF THE HEMLOCK LOOPER
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PROVINCE OF ONTARIO

B. M. McGugan[1], W. H. Haliburton[2], and J. E. MacDonald[1]

INTRODUCTION

Continuing the policy adopted in 1950, a single report is presented on forest insect conditions in the Province of Ontario, through the co-operation of officers of the Forest Insect Laboratory, Sault Ste. Marie, and the Dominion Entomological Laboratory, Ottawa. A wide variety of conditions was evident in forest insect infestations within the Province during 1951. Infestations of the forest tent caterpillar, larch sawfly, European pine shoot moth, and the European pine sawfly either increased markedly or maintained themselves at a high level. Infestations of the jack-pine budworm, yellow-headed spruce sawfly and the fall webworm were greatly reduced in 1951. Spruce budworm infestations increased in the northwest, and receded in the northeast. A number of insects such as Bruce's spanworm, *Operophtera bruceata* (Hulst.), and the oak leaf-skeletonizer, *Bucculatrix ainsliella* Murdf. were recovered in appreciable numbers for the first time in 1951.

In co-operation with the Laboratory of Insect Pathology a technician has been trained as a diagnostician of insect diseases. This has greatly facilitated the identification of disease organisms in Forest Insect Survey material and will lead to a more critical appraisal of the incidence and importance of these pathogens in forest insect populations.

A total of 1,969 collections from southern Ontario were received at the Ottawa Laboratory and 6,715 from northern Ontario were received at Sault Ste. Marie. The combined total of 8,684 collections is slightly in excess of the number for 1950. The distribution of these collections among the principal tree species was as follows:

Coniferous hosts			Deciduous hosts		
Pine Jack pine	587		Poplar Trembling aspen	1,502	
— Red pine	310		— Balsam poplar	73	
— White pine	186		— Large-toothed aspen	35	
— Scotch pine	174		— Carolina poplar	8	
— Others	29				1,618
		1,286	Birch White birch	456	
Spruce White spruce	660		— Yellow birch	33	
— Black spruce	238		— Others	128	
— Others	282				617
		1,180	Cherry		414
Balsam fir		670	Maple Red maple	140	
Larch		620	— Sugar maple	122	
Cedar White cedar	345		— Others	140	
— Red cedar	12				402
		357	Willow		314
Hemlock		75	Elm		260
Total		4,188	Alder		253
			Oak Red oak	83	
			— White oak	49	
			— Others	18	
					150
			Basswood		112
			Walnut, butternut, hickory		83
Miscellaneous hosts	70		Ash		50
No hosts specified	239		Other deciduous trees		78
			Total		4,350

Grand Total—8,848*

[1] Forest Insect Laboratory, Sault Ste. Marie, Ontario
[2] Dominion Entomological Laboratory, Ottawa

* The discrepancy between this figure and the total number of collections arises from the fact that some collections were from more than one species of host.

IMPORTANT INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.).—The spruce budworm infestations throughout the Province showed many changes during the 1951 season. In some cases there were striking increases in both population density and the area affected, in others there were no appreciable changes, and in still others there were significant reductions. Infestations in the Kenora and Sioux Lookout districts persisted at a high level with considerable extension of boundaries, particularly in the Kenora District. The infestations in the Port Arthur District remained virtually static. Marked reductions were noted in the Kapuskasing and Cochrane districts. The small infestation in the Algonquin District showed an increase in 1951.

Although the population density remained at a high level in the Lac Seul infestation, there were few changes in the boundary of heavy infestation in the Sioux Lookout District. The most notable change was between Whitemud Lake and Bowerman Township where a number of previously scattered pockets coalesced in 1951. However, there were significant changes in the southwestern boundary of the Lac Seul infestation in the Kenora District. The boundary of heavy infestation is now continuous from Fletcher Lake on the Kenora-Sioux Lookout boundary, southeast through Red Deer Lake, MacNicol Township and Hawcliff Lake to the south shore of Eagle Lake. Several patches of medium infestation were mapped north and east of Dryden which indicate the possibility of a sizable southeastward extension of the Lac Seul infestation in 1952.

The most striking change in the Kenora District was the increase to the southwest of the more recent Lake of the Woods infestation. This infestation changed from a narrow band between Kenora and Sioux Narrows to a roughly rectangular area bounded by Kenora, Glass Township, Split Rock Island south of the Aulneau Peninsula, and Devonshire Township.

The infestation around Sioux Lookout and Hudson which has remained relatively static for several years showed some intensification and extension east of Hudson and southwest along Abram Lake.

In the Port Arthur District, sufficient larvae persisted in an area between Little Sturge, Disraeli, and Sturge lakes to cause medium defoliation of balsam-fir trees previously weakened by several years' defoliation. Throughout the remainder of the Lake Nipigon area spruce budworm populations were at a very low level. The heavy infestation continued on Sibley and Black Bay peninsulas over approximately the same areas as in 1951. Population studies point to a continuation of high populations in 1952.

As in 1950, the only sizable area of heavy infestation that remained in the Kapuskasing-Cochrane area occurred along the boundary between the two districts south of the CNR. The infestation was located mainly in Shackleton and Carmichael townships in the Kapuskasing District, and in Haggart and Sydere townships in the Cochrane District. Other areas of medium to heavy infestation were centred in Rodgers and Studholme townships west of Hearst, in Fauquier Township east of Kapuskasing, in Menapia and Beniah townships southeast of Smooth Rock Falls, and along the south shore of Lake Abitibi.

Following a recession in 1950, the infestation in the southeast corner of the Algonquin District showed a noticeable increase in 1951. The area of heavy infestation which was confined to a small pocket in Wilberforce Township in 1950 spread to the southeast into Bromley Township in 1951. North of this area in Alice and Wylie townships, the population declined sharply.

The area of heavy mortality of balsam fir in the Lac Seul infestation extended farther southward from Perrault, Wabashkang, and Anishinabi lakes. There has been an intensification and slight southwestern extension of heavy mortality

south of Lake Nipigon. Mortality of mature white spruce has been general throughout the Lake Nipigon infestation. As a result of the limited changes in the areas of tree mortality, only an infestation map has been included with this report.

	Collections		Collections
Algonquin	12	North Bay	3
Cochrane	85	Parry Sound	1
Fort Frances	25	Port Arthur	78
Geraldton	10	Quinte	3
Gogama	3	Rideau	7
Kapuskasing	63	Sault Ste. Marie	7
Kenora	73	Sioux Lookout	113
Lake Erie	3	Sudbury	3
Lake Simcoe	5	Timiskaming	4

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.—The 1951 outbreak of the forest tent caterpillar in Ontario was probably the largest and most spectacular forest insect outbreak that has ever been recorded in the Province. In many widely separated areas the numbers of insects were so great that once they had denuded the host stands of poplar, maple and oak, they migrated in vast numbers in search of food, inundating roads, fields, and even towns and villages. The caterpillars were responsible for delaying highway and rail travel, closing schools and public buildings, causing power failures, as well as interfering with use of recreational areas. As a result of these extensive mass migrations, many unusual reports of their feeding were received. Landowners reported noticeable or severe damage to various shrubs, bushes, garden plants, orchards and field crops.

The number and size of the infestations which occurred in all forest districts of Ontario with the exception of Geraldton and Lake Erie, make it inadvisable to attempt a detailed review of all infestations and their boundaries. Although only the major outbreaks are discussed here, all medium to heavy infestations are shown on the accompanying map.

One of the largest infestations occurred in poplar stands over an area in excess of 20,000 square miles in the northwestern part of the Province. It included the southcentral part of the Sioux Lookout District, the eastern half of the Kenora and Fort Frances districts, and the western one-third of the Port Arthur District. This represents a four-fold increase in area over the 1950 infestation which was located principally south of Lac Seul in the Sioux Lookout and Kenora districts. The increase in area resulted mainly from extensions to the south, east and north. Egg counts made in the fall of 1951 indicate that extremely heavy populations can be expected over virtually the same area in 1952, as well as moderate to heavy populations farther to the south and east in the Port Arthur District.

An even larger infestation of nearly 30,000 square miles occurred in the central and southern forest districts, from Batchewana Bay on Lake Superior through the southern parts of the Sault Ste. Marie, Sudbury, and North Bay districts to the Quebec border, and south through the Parry Sound and Algonquin districts to Lake Simcoe, Peterborough, Newburg, and Arnprior. Elsewhere in southern Ontario, small areas of medium to heavy infestation occurred in the central and northern parts of Grey County and north of Wiarton on the Bruce Peninsula in the Lake Huron District, and in the central part of Glengarry County in the Rideau District. This immense area of infestation resulted from the merging of four infestations that in 1950 were centred in the southern part of the Sault Ste. Marie District, the southern part of the North Bay District and the northern part of the Algonquin District, the Parry Sound District, and in the Trent and Quinte districts. Forecasts based on 1951 egg counts indicate a

continuation of moderate to heavy infestations over most of the area infested in 1951, with the exception of the area between Echo Bay and Blind River along the North Channel, and the northeastern part of Manitoulin Island, where a marked reduction in population density will occur. It is of interest to note that larval populations in these two areas reached extreme abundance in 1951 as evidenced by forced migration of larvae in the early instars and the complete defoliation of the undergrowth. However, these high larval populations were decimated by starvation, parasites, and diseases to such an extent that egg counts showed a sharp reduction in comparison with those made in 1950. Egg counts in the Sudbury and North Bay districts point to the probability of a northward spread of moderate or heavy infestation in 1952.

A sizable infestation in the central part of the Chapleau District in 1951 resulted from the coalescence of numerous small pockets of heavy infestation in 1950. It can be expected that a high population level will be maintained in this area in 1952.

On the basis of egg counts in 1950, continuation and extension of infestations in the White River, Kapuskasing, Geraldton, and Cochrane districts were forecast. However, due to the extremely low hatch in the Cochrane and Geraldton districts and the moderate hatch in the White River and Kapuskasing districts, infestations in 1951 almost disappeared or, at best, barely maintained their 1950 level. The precise cause of the low hatch is not known. Egg bands collected in September 1950, and brought to the Laboratory showed extremely poor hatch similar to those in the field. Consequently winter cold or spring frosts cannot be considered the cause. It is believed that sterility or environmental conditions during or immediately following oviposition were more likely responsible. All unhatched eggs from these areas showed no or only limited development of the embryo. The most extreme reduction took place along the Moose River watershed in the northern part of the Cochrane District. Less than 1 per cent of the eggs hatched in this area. Only a remnant of the former infestation remained in Hobson Township. The infestations in the northern part of the Kapuskasing District and the central part of the White River District persisted in 1951 at a moderate to heavy intensity. On the basis of egg counts, it appears that there will be some increase in population density in 1952.

In the Gogama and Timiskaming districts and the southern part of the Cochrane District there was an increase in the number and size of small pockets of heavy infestation in 1951. Further increases can be expected in 1952.

As a continuation of the program inaugurated in 1950, the incidence of insect parasites and disease organisms was studied at a number of widely scattered points in northern Ontario. All dead forest tent caterpillar larvae received by the Forest Insect Survey, or recovered during the rearing of larvae from these collection points, were diagnosed for the presence of disease organisms. A polyhedral virus, four species of fungus, and a protozoan disease were recovered. Although it is impossible to outline the distribution of these pathogens on the basis of the limited sampling, it appears that they are widely distributed in northern Ontario. The virus disease was the most prevalent with concentrations at Upsala in the Port Arthur District, in the southern part of the Sault Ste. Marie District and on Manitoulin Island. In these areas large numbers of dead larvae were observed adhering to the foliage and trunks of trees. Fungous diseases, predominantly *Beauveria globulifera* (Speg) Pic., were recovered from larvae from widely scattered points with a slight concentration in the Kenora-Fort Frances area. The protozoan disease was recovered from considerable numbers of larvae from the Sault Ste. Marie and Sudbury districts. The points of recovery of these disease organisms are shown on the accompanying map and the prevalence of the virus disease at the sampling points is given in the table below.

SUMMARY OF PARASITE AND DISEASE DATA PERTAINING TO FOREST TENT CATERPILLAR COLLECTION POINTS IN NORTHERN ONTARIO IN 1950 AND 1951, INCLUDING FORECASTS OF FOREST TENT CATERPILLAR INFESTATIONS IN 1952

Year / Location	1950					1951				
	Infestation Rating	Per Cent Parasitism	Prevalence of Virus	Egg Count (Av. no. bands/tree)	Forecast for 1951	Infestation Rating	Per Cent Parasitism	Prevalence of Virus	Egg Count (Av. no. bands/tree)	Forecast for 1952
Algonquin District—										
Buchanan Tp.	H	54	Absent	14·7	H	H	44	Few	16	H
Maria Tp.	H	30	.....	99	H	H	54	Few	187	H
Jones Tp.	L	.....	.....	.....	.....	H	44	Few	182	H
Chapleau District—										
Gallagher Tp.	H	33	Absent	40	H	H	43	Common	92	H
Margaret Tp.	H	40	Absent	29	H	H	44	Common	52	H
Cochrane District—										
Canfield Tp.	H	20	Present	42	H	Nil*	.....	.....	.....	.....
Carscallen Tp.	Nil	.....	.....	2	L	M	.....	.....	17	H
Fort Frances District—										
S. of Tanner Tp.	H	19	.....	44	H	H	35	Common	231	H
Halkirk Tp.	H	30	Absent	.....	.....	H	71	Absent	181	H
Eva Lake Tp.	Nil	.....	.....	.....	.....	M	11	Few	202	H
Geraldton District—										
Klotz Lake	M	.....	.....	52	H	Nil*	.....	.....	15	H
Jellicoe Tp.	M	.....	.....	67	H	Nil*	.....	.....	8	H
Gogama District—										
Keith Tp.	H	20	Absent	38	H	H	.....	Common	54	H
Kapuskasing District—										
Neely Tp.	H	.....	Present	34	H	M	60	Absent	61	H
Stoddart Tp.	M	.....	.....	32	H	M	28	Few	74	H
Kenora District—										
Wainwright Tp.	H	21	Present	45	H	H	45	Common	58	H
Ignace Tp.	H	.....	.....	.....	.....	H	20	Abundant	14	H
Gold Rock	H	.....	.....	.....	.....	H	69	Common	46	H

* Heavy infestations did not materialize as a result of extremely low hatch of 1950 eggs. Normal hatch was assumed in all forecasts made in 1950.

L—Light. M—Medium. H—Heavy.

SUMMARY OF PARASITE AND DISEASE DATA PERTAINING TO FOREST TENT CATERPILLAR COLLECTION POINTS IN NORTHERN ONTARIO IN 1950 AND 1951, INCLUDING FORECASTS OF FOREST TENT CATERPILLAR INFESTATIONS IN 1952—*Concluded*

Year Location	1950					1951				
	Infestation Rating	Per Cent Parasitism	Prevalence of Virus	Egg Count (Av. no. bands/tree)	Forecast for 1951	Infestation Rating	Per Cent Parasitism	Prevalence of Virus	Egg Count (Av. no. bands/tree)	Forecast for 1952
North Bay District										
Haddo Tp.	H	53	Absent	61	H	H	50	Absent	64	H
Commanda Tp.	H	.....	.....	105	H	H	39	Absent	122	H
Strathcona Tp.	M	.....	.....	25	H	H	46	Present	44	H
Parry Sound District—										
Armour Tp.	H	.....	.....	73	H	H	65	Common	7	H
Harrison Tp.	M	.....	.....	.....	.....	H	68	Common	76	H
Ridout Tp.	H	.....	.....	181	H	H	70	Abundant	15	H
Wood Tp.	H	29	Present	16	H	H	76	Common	25	H
Port Arthur District—										
Upsala Tp.	H	32	Present	222	H	H	13	Common	402	H
Gillies Tp.	Nil	.....	.....	.....	.....	M	37	Absent	23	H
Sault Ste. Marie District—										
Bridgland Tp.	H	14	Absent	85	H	H	87	Common	11	H
Vankoughnet Tp.	H	.....	Present	143	H	H	72	Few	60	H
Lake Simcoe District—										
Medonte Tp.	H	.....	.....	15	H	H	50	Common	11	H
Sioux Lookout District—										
Vermilion Add.	H	49	Present	61	H	H	65	Common	130	H
Jackfish Lake	H	.....	.....	18	H	H	40	Few	176	H
Sudbury District—										
Sheguiandah Tp.	H	31	Absent	119	H	H	71	Abundant	7	H
Shedden Tp.	H	32	Absent	116	H	H	63	Abundant	2	M
Bigwood Tp.	H	18	Absent	211	H	H	53	Common	14	H
Timiskaming District—										
Guibord Tp.	Nil	80	Absent	1	L	M	52	Few	36	H
White River District—										
Tp. 71	H	9	Present	43	H	H	51	Absent	22	H
Pearkes Tp.	H	24	Present	52	H	H	44	Absent	26	H

Records of parasitism were obtained by rearing a series of collections taken at particular periods of host development. The records were analysed to give percentages of parasitism which are intended to indicate the total effect of larval and pupal parasitism. The resultant figures are presented in the following table along with other data pertaining to the collection areas for both 1950 and 1951. An examination of the table indicates that in 1951 parasitism showed a general increase over 1950. Some collection points having low parasitism in 1950 are among those having the highest parasitism in 1951. The most common parasite was *Sarcophaga aldrichi* Park. which attacks pupae, followed closely by two larval parasites *Euexorista futilis* (O. S.) and *Leschenaultia exul* Tn. Percentages of parasitism ranged from 11 to 87 per cent with more than half of the records in excess of 50 per cent. Although there were no obvious correlations between the incidence of parasites and either the age or severity of infestations, there did appear to be some agreement between the extremes of parasitism and the 1951 egg counts. Where parasitism was very high egg counts tended to be low and where parasitism was very low the egg counts were amongst the highest. Examples of this trend are Bridgland Township in the Sault Ste. Marie District and Upsala in the Port Arthur District.

The noticeable increase in the effectiveness of both insect parasites and diseases in many areas of the Province in 1951 suggests the possibility that these control agents may reach effective levels in at least some areas in 1952. Reduced populations are forecast for restricted areas in the Sault Ste Marie and Sudbury districts.

	Collections		Collections
Algonquin	99	North Bay	90
Chapleau	39	Parry Sound	128
Cochrane	66	Port Arthur	124
Fort Frances	104	Quinte	15
Geraldton	13	Rideau	64
Gogama	11	Sault Ste. Marie	122
Kapuskasing	77	Sioux Lookout	59
Kenora	64	Sudbury	213
Lake Erie	2	Timiskaming	70
Lake Huron	40	Trent	44
Lake Simcoe	30	White River	25

European Pine Shoot Moth, *Rhyacionia buoliana* (Schiff.).—This species is now widely distributed through most of the southwestern region and is increasing in numbers. Infestations occurred on the Bruce Peninsula, around the southern end of Georgian Bay, south through Simcoe and Peel counties, east through York County, and more sparsely east along the northern shore of Lake Ontario to Brockville. Collections made in the boundary areas are plotted on the accompanying map. The area to the south and west of this boundary was generally infested, usually more heavily near the lake shores. A localized infestation on Mugho pine continues at a moderate level in the Ottawa area.

The shoot moth has attacked red, Scotch, jack, Austrian, and Mugho pines, principally in plantations, shelterbelts, highway windbreaks and landscape plantings. Low-growing trees in the open and exposed edges of plantings are most commonly attacked. Infestations in many areas have severely damaged plantations, seriously affecting the form of the trees and, in some cases, reducing them to scrub status. Highway plantings offer ideal conditions and serve as avenues of advance and perhaps as foci of infection for nearby plantations. Serious concern as to the future of red pine as a reforestation species in southern Ontario has been expressed by many foresters.

	Collections		Collections
Lake Erie	32	Quinte	1
Lake Huron	68	Rideau	10
Lake Simcoe	52	Trent	2

Larch Sawfly, *Pristiphora erichsonii* (Htg.).—Whilst infestations of the larch sawfly continued to spread eastward through the Geraldton and Kapuskasing districts, some recessions in population intensity and damage were noted in the northwestern region of the Province. Whereas complete defoliation of larch stands has been common during the past few years in the northwestern region, defoliation in 1951 ranged from 20 to 70 per cent with only occasional trees showing complete defoliation. During the collection of cocoon samples in this area, evidence of unusually high control by rodents was noted. In some cases it was difficult to obtain sizable collections of sound cocoons.

Heavy infestation continued in the western part of the Port Arthur District. Throughout the remainder of the District populations increased to moderate or heavy intensity. Light infestations were found generally throughout the Geraldton District except in Legault Township and along Highway 17 to Terrace Bay where medium to heavy infestations occurred. In the Kapuskasing District larch sawfly infestations increased along Highway 11 as far east as Harty. Small, medium infestations were noted in Kohler and Shuel townships.

In the eastern part of northern Ontario a small medium infestation was found in Grenfell Township in the Timiskaming District. A light infestation occurred in southern Ontario in Eastnor and Lindsay townships in the Lake Huron District.

	Collections		Collections
Chapleau	1	Lake Simcoe	2
Cochrane	2	Parry Sound	8
Fort Frances	36	Port Arthur	106
Geraldton	58	Sault Ste. Marie	1
Gogama	1	Sioux Lookout	93
Kapuskasing	25	Timiskaming	10
Kenora	80	White River	1
Lake Erie	2	Quinte	1
Lake Huron	14		

European Pine Sawfly, *Neodiprion sertifer* (Geoff.).—This serious pest of Scotch pine continued to infest plantings in the Lake Erie and Lake Huron districts. Some northward and eastward extensions of its distribution have been noted in the Lake Huron District, with little or no change in the Lake Erie District. As far as is known, this sawfly occurs only in southwestern Ontario, south of a line drawn generally from Lucknow and Wingham through Preston, Mount Vernon and St. Thomas. Defoliation was most severe in the Bothwell-Strathroy area where 50 to 100 per cent of the old foliage was destroyed.

	Collections		Collections
Lake Erie	18	Lake Huron	9

Red-headed Pine Sawfly, *Neodiprion lecontei* (Fitch).—Plantations and roadside plantings of red and Scotch pine in several localities in southern and central Ontario were infested in 1951. The heaviest populations were reported in the counties surrounding Lake Simcoe, in Medora and Machar townships in the Parry Sound District, between North Bay and Mattawa and near Sturgeon Falls in the North Bay District, and in five counties of the Lake Huron District between Bruce Peninsula and Lake Ontario. Medium infestations were found in Strong and McLean townships in the Parry Sound District and Wilkes Township in the Algonquin District; and in Day Township and along Highway 17 east of Blind River, in the Sault Ste. Marie District. A further reduction in the abundance of this sawfly was observed throughout the Trent, Quinte and Rideau districts.

	Collections		Collections
Algonquin	6	Quinte	10
Lake Huron	47	Rideau	18
Lake Simcoe	36	Sault Ste. Marie	6
North Bay	3	Sudbury	2
Parry Sound	42	Trent	23

Introduced Pine Sawfly, *Diprion similis* (Htg.).—Collections of this species in 1951 indicate that it has extended its range to the west as far as the eastern limit of the range of *Neodiprion sertifer* (Geoff.) outlined above. The northern and eastern boundaries of the infested area remained approximately as mapped in 1950. Populations in Mono Township in the Lake Simcoe District were heavier than in 1950.

	Collections		Collections
Lake Huron	7	Lake Simcoe	10

Yellow-headed Spruce Sawfly, *Pikonema alaskensis* (Roh.).—There has been a sharp reduction in the populations of this sawfly in all previously reported infestations in the central region of Ontario. This was particularly noticeable in the infestations on black spruce north of Webbwood in the Sudbury District. The only severe infestations found in northern Ontario in 1951 were in Whitney Township in the Cochrane District and on highway plantings near Sturgeon Falls in the North Bay District. In southern Ontario this sawfly was found commonly in large numbers in Bruce, Grey and Simcoe counties bordering Georgian Bay and in the Limerick Forest in the Rideau District.

	Collections		Collections
Algonquin	33	North Bay	35
Chapleau	22	Parry Sound	41
Cochrane	60	Port Arthur	27
Fort Frances	23	Quinte	3
Geraldton	6	Rideau	23
Gogama	18	Sault Ste. Marie	46
Kapuskasing	13	Sioux Lookout	7
Kenora	6	Sudbury	43
Lake Erie	1	Timiskaming	25
Lake Huron	27	Trent	2
Lake Simcoe	34	White River	11

European Spruce Sawfly, *Diprion hercyniae* (Htg.).—The light infestation on open-grown white spruce in the southern part of the Sault Ste. Marie District persisted in 1951 and spread slightly to the south and east.

For the third year the only record of this sawfly west of Sault Ste. Marie in Ontario came from the Fort Frances District where small numbers of larvae were recovered at Basswood Lake. Another interesting record was the recovery of this species on black-spruce trees east of Iroquois Falls in the Cochrane District. This represents a northward extension of the known range of this insect in Ontario.

Populations in forest districts east and south of the Sault Ste. Marie District maintained themselves or, in isolated cases, showed evidence of a slight increase.

	Collections		Collections
Algonquin	17	Quinte	4
Cochrane	9	Rideau	9
North Bay	42	Sault Ste. Marie	24
Lake Erie	4	Sudbury	11
Lake Huron	31	Timiskaming	16
Lake Simcoe	66	Trent	4
Parry Sound	14		

Balsam-Fir Sawfly, *Neodiprion abietis* Harr.—Infestations on scattered, open-grown balsam-fir trees were reported from three forest districts; Sault Ste. Marie, Lake Simcoe and Lake Huron. In the Sault Ste. Marie District, the infestation spread considerably in 1951 and now extends throughout the entire southern portion of the District. Although the infestation was generally light, occasional trees showed defoliation up to 80 per cent of the old foliage.

Colonies were found generally throughout Simcoe and Ontario counties in the Lake Simcoe District. Moderate to heavy defoliation occurred between Port Severn and Honey Harbour. Light to medium infestations occurred on both balsam fir and white spruce in the central part of Bruce Peninsula in the Lake Huron District. The infestation of Fishing Islands reported in 1950 was not examined in 1951.

	Collections		Collections
Algonquin	8	Lake Simcoe	11
Chapleau	1	North Bay	7
Cochrane	4	Parry Sound	7
Fort Frances	4	Rideau	4
Geraldton	3	Sault Ste. Marie	23
Gogama	1	Sioux Lookout	2
Kapuskasing	3	Sudbury	11
Kenora	1	Timiskaming	1
Lake Huron	21	White River	1

Jack-pine Sawfly, *Neodiprion americanus banksianae* Roh.—Infestations were again numerous in central and southern Ontario in 1951. Populations were heaviest at the following points: Parke Township west of Sault Ste. Marie, Great Cloche Island in the Sudbury District, and in Glengarry, Stormont and Carleton counties in the Rideau District. Light to medium infestations occurred in Fairbairn Township in the Sudbury District, between Elk Lake and Gowganda in the Timiskaming District and in Bruce, Grey and Simcoe counties south of Georgian Bay.

	Collections		Collections
Algonquin	1	North Bay	1
Chapleau	1	Parry Sound	14
Cochrane	1	Quinte	3
Fort Frances	6	Rideau	15
Gogama	1	Sault Ste. Marie	4
Kapuskasing	5	Sioux Lookout	1
Kenora	3	Sudbury	2
Lake Huron	44	Timiskaming	6
Lake Simcoe	10	White River	1

Red-headed Jack-pine Sawfly, *Neodiprion virginiana* Roh.—Light infestations of this sawfly occurred on jack pine in the Gogama, Timiskaming and Quinte districts. In the Gogama District infestations persisted in MacMurchy and Groves townships and a new infestation was noted in Togo Township. Colonies were more numerous in the vicinity of Gogama but have not reached infestation proportions. The light infestation in Melba Township of the Timiskaming District did not increase in intensity but covered an appreciably larger area in 1951. A light infestation in the Quinte District was located at Renfrew.

Although no infestations were present, colonies were reported as more numerous in the Port Arthur District, particularly around Kashishibog Lake, and in the North Bay and Kenora districts.

	Collections		Collections
Algonquin	1	Port Arthur	10
Chapleau	2	Quinte	3
Cochrane	3	Rideau	1
Fort Frances	4	Sault Ste. Marie	1
Geraldton	3	Sioux Lookout	3
Gogama	21	Sudbury	5
Kapuskasing	5	Timiskaming	24
Kenora	20	White River	1
North Bay	6		

Red-pine Sawfly, *Neodiprion nanulus* Schedl.—Three infestations on jack pine were reported in northern Ontario in 1951. The heaviest infestation

occurred on an island in the west arm of Eagle Lake in the Kenora District. The light infestation reported between Ek Lake and Gowganda in the Timiskaming District in 1950 ocurred over a somewhat wider area in 1951. A small number of colonies were found in Parke Township west of Sault Ste. Marie where red-pine trees were also affected.

	Collections		Collections
Algonquin	4	Quinte	1
Fort Frances	2	Rideau	1
Kapuskasing	1	Sault Ste. Marie	4
Kenora	9	Sioux Lookout	1
North Bay	6	Sudbury	4
Parry Sound	3	Timiskaming	19
Port Arthur	1	White River	1

Swaine's Jack-pine Sawfly, *Neodiprion swainei* Midd.—After a recession for two years, the infestation in the Temagami Lake area in the North Bay District showed a slight increase in intensity. Jack-pine trees on a few inslands in Lake Temagami and Lady Evelyn Lake were heavily attacked. Colonies appeared to be somewhat larger than in 1950, as well as more numerous.

A light infestation was present in the vicinity of Gogama, and a small heavy infestation occurred at Bagsverd Lake west of Gogoma.

	Collections		Collections
Fort Frances	1	North Bay	30
Gogama	10	Sioux Lookout	1
Kapuskasing	1	Sudbury	2
Kenora	14	Timiskaming	2

Birch Sawfly, *Arge pectoralis* (Leach).—Infestations of the birch sawfly in northern Ontario declined in 1951. Small areas of heavy infestation were reported at Ivanhoe Lake in the Gogama District, on Manitoulin Island in the Sudbury District, and at Bay Lake in the North Bay District. A light infestation was present at Round Lake in the Timiskaming District.

	Collections		Collections
Algonquin	11	Parry Sound	1
Cochrane	4	Quinte	1
Gogama	5	Rideau	1
Kenora	3	Sault Ste. Marie	5
Lake Erie	1	Sudbury	22
Lake Huron	1	Timiskaming	22
North Bay	34		

Mountain-Ash Sawfly, *Pristiphora geniculata* (Htg.).—Mountain-ash trees in the northern part of the Lake Huron and Lake Simcoe districts and in the southern part of the Parry Sound and Algonquin districts were heavily infested in 1951.

	Collections		Collections
Algonquin	7	Parry Sound	16
Lake Huron	22	Rideau	3
Lake Simcoe	8	Trent	1
North Bay	1		

Eastern Hemlock Looper, *Lambdina fiscellaria fiscellaria* (Guen.).—The heavy infestation on balsam fir and white birch on Long Point in Lake Abitibi east of Cochrane, first reported in 1950, persisted in 1951 but the infested area was smaller. In the Parry Sound District heavy infestations on hemlock continued on the islands and shoreline of Lake Joseph, and a new area of heavy infestation was reported on Crown Island in Lake-of-Bays. The light infestation on Manitoulin Island continued on a wide variety of coniferous and deciduous

hosts. The heavy infestation reported in 1950 at Ivy Lea in the Rideau District subsided to a light intensity in 1951; only 5 per cent defoliation of hemlock trees was reported.

	Collections		Collections
Algonquin	7	Lake Simcoe	14
Chapleau	2	North Bay	12
Cochrane	15	Parry Sound	20
Fort Frances	38	Port Arthur	1
Kapuskasing	3	Rideau	10
Kenora	1	Sault Ste. Marie	13
Lake Erie	5	Sioux Lookout	15
Lake Huron	10	Sudbury	13

Jack-Pine Budworm, *Choristoneura* sp.—Jack-pine budworm populations in the Province of Ontario have declined to their lowest level since this report was first published. The only infestation occurred in Norfolk County in the Lake Erie District where relatively heavy populations were found on jack-pine trees.

	Collections		Collections
Kenora	8	Lake Simcoe	2
Lake Erie	7	Sault Ste. Marie	2

Spotless Fall Webworm, *Hyphantria textor* Harr.—Webworm infestations have completely disappeared in northern Ontario except in the southern part of the Timiskaming District where high populations persisted in 1951. In southern Ontario light infestations occurred in the Lake Simcoe District and around Lake Scugog in the Trent District. Elsewhere the webworm was less common than in previous years. The principal hosts attacked were white birch, elm, ash, cherry and alder.

	Collections		Collections
Algonquin	14	North Bay	17
Cochrane	4	Parry Sound	7
Fort Frances	1	Rideau	1
Gogama	1	Sudbury	1
Lake Erie	5	Timiskaming	26
Lake Huron	2	Trent	5
Lake Simcoe	7		

Western Tent Caterpillar, *Malacosoma pluviale* (Dyar).—A striking decrease in the prevalence of this tent caterpillar occurred in the Timiskaming and Gogama districts. Populations remained static or declined markedly throughout the remainder of northern Ontario with the exception of the Cochrane District where there was a noticeable increase in the southern part of the District.

	Collections		Collections
Chapleau	2	Parry Sound	1
Cochrane	19	Port Arthur	9
Fort Frances	2	Sault Ste. Marie	14
Geraldton	5	Sioux Lookout	8
Gogama	15	Sudbury	4
Kenora	4	Timiskaming	12
North Bay	4	White River	14

Eastern Tent Caterpillar, *Malacosoma americanum* (F.).—Tents of this species were prevalent on cherry throughout most of the forest tent caterpillar infestation in the central and southern part of Ontario that was described above. The amount of damage caused by this tent caterpillar was obscured by the extensive migrations and feeding of the forest tent caterpillar.

	Collections		Collections
Algonquin	38	Parry Sound	31
North Bay	22	Sault Ste. Marie	11
Lake Simcoe	4	Sudbury	30

Larch Casebearer, *Coleophora laricella* (Hbn.).—Severe browning of larch foliage was caused by high populations of this species in several areas in the central part of Grey and Bruce counties in the Lake Huron District; in Simcoe, Ontario and York counties in the Lake Simcoe District; and in the southern part of the Parry Sound District. On the basis of quantitative samples, populations in the Vivian Forest and at Uxbridge were two to three times as great as in 1950. In the southeastern region infestations were heavy in Victoria County, medium in Hastings County and light in Lanark and Carleton counties.

	Collections		Collections
Algonquin	5	Sault Ste. Marie	6
North Bay	1	Sudbury	4
Parry Sound	22		

Aspen Blotch Miner, *Lithocolletis tremuloidiella* (Braun.).—Extremely heavy infestations were present on trembling aspen throughout northern Ontario with the exception of the southern parts of the Sault Ste. Marie, Sudbury and North Bay districts and the Parry Sound and Algonquin districts. The only infestation in southern Ontario was in the vicinity of Ottawa. In general, the foliage of small trees or the lower part of the crowns of larger trees was the most severely affected by this insect.

	Collections		Collections
Algonquin	16	North Bay	13
Chapleau	30	Port Arthur	27
Cochrane	49	Sault Ste. Marie	7
Fort Frances	13	Sioux Lookout	28
Geraldton	33	Sudbury	29
Gogama	48	Timiskaming	38
Kapuskasing	16	White River	15
Kenora	12		

Spring Cankerworm, *Paleacrita vernata* (Peck).—Heavy infestations were present at Harwood Plains in the Rideau District and Craighurst in the Lake Simcoe District, where elms were completely stripped. In both cases the infestations have been present for two or three years. Light defoliation was reported from a number of areas in the Rideau and Lake Erie districts. Hosts were elm, basswood and pin oak.

In northern Ontario the only report of damage by this insect was from the town of Fort Frances where Manitoba maple and elm trees sufferred light to medium defoliation.

	Collections		Collections
Lake Erie	6	Quinte	1
Lake Huron	2	Rideau	7
Lake Simcoe	3		

Fall Cankerworm, *Alsophila pometaria* (Harr.).—The fall cankerworm was somewhat more abundant in 1951 in the southwestern region in 1950. The light infestation previously reported in Welland and Haldimand counties persisted at a slightly higher level. Larvae were collected from a wide variety of deciduous hosts including elm, basswood, oak, ash, hickory, ironwood and aspen. Small scattered infestations were reported in the central part of the Lake Huron District. In contrast, fewer collections were received in 1951 from the southeastern region than in 1950.

	Collections		Collections
Fort Frances	1	Quinte	5
Lake Erie	34	Rideau	10
Lake Huron	15	Trent	3
Lake Simcoe	9		

Elm Leaf Beetle, *Galerucella xanthomelaena* (Schr.).—Infestations reported previously in Lincoln and Welland counties in the Lake Erie District remained at the same level as in 1950. Elm trees were sprayed in St. Thomas where heavy populations occurred in 1950; only light feeding resulted in 1951.

	Collections
Lake Erie	1

Smaller European Elm Bark Beetle, *Scolytus multistriatus* (Marsh.).—This vector of Dutch elm disease was collected near Selkirk and Caledonia in Haldimand County in the Lake Erie District. Previously this beetle had been recovered from Lambton, Middlesex and Elgin counties and in the vicinity of Niagara Falls in Welland County. The 1951 records indicate that the species is probably spreading westward through the Niagara Region.

	Collections
Lake Erie	3

Pine Needle Miner, *Exoteleia pinifoliella* (Chamb.).—Damage by this species was generally less prevalent than in past years. Heavy populations were noted only in Fitzroy Township in the Rideau District.

	Collections		Collections
Lake Erie	1	Trent	1
Rideau	4		

Walnut Caterpillar, *Datana integerrima* G. & R.—Larvae were common on individual walnut trees in the central part of the Lake Huron District and in the Lake Erie District. Heaviest populations occurred in the counties of Elgin, Kent, Oxford, Perth and Huron. Damage was more serious on trees growing on poor sites.

	Collections		Collections
Lake Erie	12	Trent	1
Lake Huron	26		

Orange-Striped Oakworm, *Anisota senatoria* (A. & S.)—Heavy populations were reported on oak trees in the vicinity of Battawa in the Quinte District. Light defoliation was noted in the southeastern part of the Lake Huron District and larvae were collected commonly in the Lake Erie District.

	Collections		Collections
Lake Erie	7	Quinte	2
Lake Huron	5		

Arborvitae Leaf Miners, *Argyresthia* spp.—Damage to the foliage of eastern white cedar by larvae of three species belonging to this genus was very noticeable in many parts of southern Ontario. Damage was heaviest in Carleton and Lanark counties in the Rideau District where up to 75 per cent of the foliage was affected. Some tree mortality has been attributed to the work of these mining larvae. Light to medium infestations occurred in Grey and Bruce counties in the Lake Huron District.

Three species are involved: *A. thuiella* (Pack.), *A. freyella* (Wlshm.), and an undescribed species. All three usually occurred together in varying proportions. Some collections of *A. thuiella* alone were made in the Lake Erie and Rideau districts. Parasitism by a small chalcidoid species *Pentacnemis bucculatricis* How. was heavy in some areas.

	Collections		Collections
Lake Erie	4	Rideau	15
Lake Huron	11		

Bruce's Spanworm, *Operophtera bruceata* (Hulst.).—Previously this species, a close relative of the European winter moth, had been collected by the Forest Insect Survey from only a few localities and in small numbers. In 1951, a relatively heavy infestation occurred in a small stand of hard maple at Merivale in the Rideau District. Small numbers of larvae were collected at several points in the Lake Simcoe and Lake Erie districts. Hosts were hard maple, basswood, elm, trembling aspen and yellow birch.

	Collections		Collections
Lake Erie	1	Rideau	4
Lake Simcoe	9		

Basswood Looper, *Erannis tiliaria* Harr.—A large proportion of collections taken from hardwood trees in southern Ontario contained larvae of this species. In some areas they were numerous enough to cause part of the defoliation attributed to various cankerworms with which the species was commonly associated. Up to 50 larvae were obtained from single trees.

	Collections		Collections
Lake Erie	26	Quinte	5
Lake Huron	31	Rideau	31
Lake Simcoe	31	Trent	17

Oak Leaf Skeletonizer, *Bucculatrix ainsliella* Murdf.—Appreciable foliage injury by first generation larvae was recorded in red oak stands in Lincoln, Welland, Elgin and Middlesex counties in the Lake Erie District. The species has two generations each year. This insect is a recognized forest pest in the United States and was collected in 1951 for the first time by the Forest Insect Survey.

	Collections
Lake Erie	8

Imperial Moth, *Eacles imperialis pini* (Drury).—Unusually high larval populations occurred on white and red pine in many localities in the Lake Simcoe District. South of Orillia 15 red-pine trees suffered 50 per cent of defoliation and as many as 38 larvae were counted per tree.

	Collections		Collections
Algonquin	1	Sault Ste. Marie	1
Lake Simcoe	22	Sudbury	1
Parry Sound	1	Trent	2

Elm Lace Bug, *Corythucha ulmi* O. & D.—Elm trees bordering Highway 7 in Lanark and Frontenac counties in the Rideau and Quinte districts were severely attacked. Approximately 95 per cent of the foliage of some trees turned brown prematurely due to the feeding of this insect. Damage was also noted in Leeds and Prescott counties in the Rideau District.

	Collections
Rideau	4

Walkingstick, *Diapheromera femorata* (Say).—After subsiding in 1950, walkingstick infestations revived in 1951 particularly in Northumberland County in the Trent District where defoliation ranged up to 75 per cent. Light to medium populations were reported over 3 to 4 square miles at Cape Croker and at Colpoy on the Bruce Peninsula. Preferred hosts were oak, cherry, white birch, and basswood.

	Collections		Collections
Lake Erie	3	Rideau	1
Lake Huron	5	Trent	3

American Poplar Leaf Beetle, *Phytodecta americana* (Schaeff.).—This beetle was found commonly in all forest districts of northern Ontario from Port Arthur east to Algonquin. The heaviest populations occurred in the White River, Cochrane and North Bay districts.

	Collections		Collections
Algonquin	2	North Bay	16
Chapleau	19	Parry Sound	4
Cochrane	24	Port Arthur	16
Fort Frances	2	Rideau	1
Geraldton	4	Sault Ste. Marie	5
Gogama	9	Sudbury	24
Kapuskasing	10	Timiskaming	7
Kenora	3	White River	11

LIST OF CO-OPERATORS

Algonquin District

Name	Collections	Name	Collections
Benim, H.	1	Higginson, M.	2
Benson, B. B.	4	Holmburg, G.	1
Bimm, H.	3	Kennedy, J.	1
Borutski, M. F.	5	McCormick, T.	8
Boyle, B.	12	McIsaor, W. M.	1
Bruce, D. S.	1	McLachan, J.	1
Christie, W. D.	2	Mitchel, F.	2
Christie, W.	1	Morin, J.	1
Dornan, H. S.	2	Pierce, P. H.	2
Eady, S.	4	Prange, A.	1
Edwards, R.	1	Ryan, D.	1
Eno, L.	1	Shalla, J. J.	5
Gauthier, J.	6	Stack, H.	5
Gimby, W. E.	13	Stiell, W. M.	1
Gordon, A.	2	Stringer, D.	8
Grant, A. M.	5	Tait, J.	2
Griffiths, J. D.	9	Tennant, W. S.	1
Hamilton, G. G.	8	Turcotte, L.	1
Haynes, H.	1	Wilson, A.	1
Heintzman, G.	11		

Chapleau District

Name	Collections	Name	Collections
Bain, J. R.	3	McHugh, W.	1
Charron, A.	11	Memegos, B.	4
Charron, P.	11	Memegos, J.	4
Collard, J. E.	5	Merritt, D.	1
Collard, R.	1	O'Donnel, B.	1
Cusson, K.	1	Paquette's Camp	1
Cusson, R.	1	Punstel, W.	1
Eveline, H.	9	Robertson, R.	1
Goebble, G.	1	Sanderson, S. L.	5
Howes, J. E.	2	Sillers, S.	2
Jackson, W. D.	1	Souliere, D.	3
Johnston, J.	3	Stenson, E.	1
Johnston, M.	1	Stevenson, T.	1
Legace, G.	2	Story, D.	2

Cochrane District

Name	Collections	Name	Collections
Andrews, W. H.	3	Boivin, M.	3
Avgen, J. G.	3	Boyd, K.	1
Beattie, J.	1	Boyd, M.	9
Belaire, L.	2	Boyle, D. R.	6
Bentley, H.	8	Boyle, G.	3

LIST OF OPERATORS—Continued

Cochrane District—*Concluded*

Name	Collections	Name	Collections
Braendle, C. C	1	Keech, S	1
Brown, R	3	Levigne, J. C	6
Carson, J. E	2	Lyons, J. D	6
Christie, A	1	McDonald, I	2
Conture, L	1	McInnis, D	9
Cooke, T	2	McLellan, J. D	6
Crealock, A	1	McWhirter, J	2
Desaulniers, I. E	6	Menard, A	15
Dolan, P. M	3	Miller, M	3
Dreyer, E. K. E	1	Mulligan, B	2
Duhamel, L	7	Neil, E	16
Duncan, G	5	O'Donnel, J	1
Duncan, W	1	O'Grady, D	3
Findlay, C	2	Osborne, W	6
Finlay, C	4	Paterson, D. G	5
Fiske, K. H	1	Picotte, J	9
Foley, J. J	1	Poisonneault, G. Rev	2
Frank, M	12	Poissant, R	4
Froud, W	6	Quick, K	3
Gill, J. A	1	Sherican, G	5
Girard, F. L	5	Spencer, F. P	1
Goode, H	3	Stancury, C. A	1
Graham, R	1	Thorkilson, O	8
Harris, O. G	1	Vallier, E	1
Hogberg, K	3	Van Vlymen, V. P	1
Hughes, S	2	Wildman, R. B	9
Hurst, F	4	Wiskin, K	14
Jerumchuck, M	5	Woodall, R	10

Fort Frances District

Name	Collections	Name	Collections
Aho, B	1	Melin, E. A	2
Burton, J. D	17	Neal, G. T	58
Callahan, D	11	Parker, A. E	1
Champagne, G	15	Payne, G. W	2
Delahey, G. W	1	Rawn, L	1
Douglas, S. W	8	Richardson, C. R	1
Dustak, F	12	Rumney, J	1
Mayhew, G	1	Walsh, J	3
McCool, R	1	Whiddon, J	6

Geraldton District

Name	Collections	Name	Collections
Armstrong, G. C	2	Picotte, D	1
Brady, R. V	1	Scott, B	9
Burtt, A	4	Wesley, B	6

Gogama District

Name	Collections	Name	Collections
Barnes, F	4	Hayes, D	1
Barrett, B	1	Huppe, J. A	5
Bayer, C	1	Lafontaine, G	2
Bellavance, P	6	Languerand, J. R	4
Clavelle, J. H	1	Lyons, J	3
Damour, C	2	Morin, L	9
Dingee, G	2	Sanderson, S. L	2
Dingee, G. Jr	4	Thibeault, E	1
Duquay, G. E	2	Turnbull, N. J	1
Eno, J	4	Waldrift, D	2
Forteski, A	3	Wright, J	2

LIST OF CO-OPERATORS—Continued

Kapuskasing District

Name	Collections	Name	Collections
Barna, G.	5	Lepinskie, B.	5
Bell, G. W.	3	Martel, E.	6
Bergsma, T.	2	Martel, L. C.	3
Bonner, E.	1	McGloan, J. W.	2
Caulombe, R.	2	Mitchell, D.	1
Clark, E.	1	Payeur, A.	1
Clavelle, J. H.	10	Pinette, J.	1
Dept. of Agriculture, Kapuskasing	1	Poitras, G.	1
Duhaime, G.	3	Shaw, J.	1
George, P. J.	2	Shields, W.	1
Greer, R.	1	Vihonen, E. L.	1
Hutchison, H. E.	1	Vincent, T. Jr.	1
Iserhoff, P.	2	Wiley, A. R.	1
Kitchebra, J.	6	Wilson, B.	3

Kenora District

Name	Collections	Name	Collections
Anderson, J.	8	Knowles, D.	1
Armstrong, G. G.	1	Lundmark, A.	7
Bowes, F.	1	Minor, J.	1
Brough, W.	2	Murphy, T.	2
Brown, W.	1	Nash, H.	1
Burton, E. C.	4	Nordstrom, S.	1
Borup, P.	1	Pigott, W.	1
Cleavely, J.	10	Ringham, L.	2
Ganglott, O.	2	Robson, A.	5
Gouet, R.	4	Tacknyk, J.	1
Hummel, B. W.	1	White, W.	1
Kincaid, J.	1		

Lake Erie District

Name	Collections	Name	Collections
Adlam, W. D.	6	Munro, H. A. U.	1
Bassett, F.	1	Walley, G. S.	4
Cronmiller, Rev. C. R.	1	Whitfield, A.	1
Doak, E.	1	Wingrove, E.	1
Emond, R. E.	1	Wingrove, F.	1
Keam, M. C.	1	Zavitz, C. H.	4

Lake Huron District

Name	Collections	Name	Collections
Cameron, H. A.	3	Jackson, J. C.	6
Clark, Chas.	1	Johnston, E. F.	8
Cressman, E. M.	10	Kennedy, P. J.	3
Danes, E.	1	Marritt, I. C.	1
Elliott, V.	1	Obermeyer, P.	1
Groves, C. R.	8	Peacock, A. H.	1
Hanmer, A.	1	Samells, A. B.	5
Hornburg, E.	1		

Lake Simcoe District

Name	Collections	Name	Collections
Carmichael, A. J.	7	Lewis, E. A.	1
Couts, J. M.	1	Linton, G. M.	1
Day, Chas. E.	2	McLean, R.	1
Farney, Rev. C. M.	1	McPhee, D. F.	1
Harris, R. J.	1	Miles, E.	1
Humphrey, E. H.	1	Newcombe, W. J. B.	1
Kirby, C. S.	12	Pallister, E.	2
Lea, Jos.	11	Peacock, D. M.	17

LIST OF CO-OPERATORS—Continued

North Bay District

Name	Collections	Name	Collections
Archibald, H. M	1	Larcher, A	4
Bastien, P	3	Laundrault, A	1
Bigelow, R	9	Laundrault, O	9
Bouchey, E	1	Laperriere, F	11
Buckley, R	1	McCormick, T	20
Burns, D	2	McGaghran, P	2
Cartier, W	1	Miller, F. M	2
Chalk, A. W	3	Morin, E. J	1
Chivers, Mrs	1	Morin, J	4
Conner, R. C	1	O'Shea, J	3
Day, D. J	3	Peck, D	2
Dept. Lands & Forests, Field	3	Piche, J	13
Durrett, S	12	Price, H	32
Gillies, F	2	Rose, G	3
Goulard, E	1	Sanderson, J	1
Gratton, H. H	1	Sandison, A	9
Harnden, R	1	Sandison, G	1
Harvey, N. A	13	Smith, R	1
Hawley, W. J	9	Snyder, A. D	7
Hibert, H	1	Tennant, W. S	1
Jackson, A	3	Tremblay, F	2
Jodouin, A	1	Trudel, E	3
Labarge, C	1	Williams, J	1
Lafleur, E	1	Yeates, C. E	1

Parry Sound District

Name	Collections	Name	Collections
Allard, C	1	McEachern, M	2
Barber, W. J	1	McGuire, F. M	1
Booker, J. S	1	McInnis, C	1
Brock, P	1	McVeety, E. B	1
Brooks, E	1	Odorizzi, P	1
Crealock, A	1	Parris, T	1
Cubitt, W. T	2	Peacock, D. M	29
Dempsey, E. M	1	Poitress, A. E	1
Dept. Lands & Forests, Pakesley Hdqt	2	Ross, A. E	20
Diamond, E	1	Scarr, G	1
Featherstone, H. J	2	Schillemore, R. W	7
Fleming, D. G	2	Simms, R	1
Fleming, J	1	Smith, L	16
Flesher, G	1	Snow, R. L	2
Forest Ranger School, Dorset	5	Stephenson, M	3
Grinnell, H. R	5	Stringer, D	1
Hinsberger, C	2	Thomas, P. A	3
Humphrey, W. A	2	Tracy, L. F	3
Kimberlay, R	1	Whalen, H. N	1
Langstaff, F	1	Wilson, D. R	2
Mathewes, W	1	Wilson, M. C	1
		Woodward, V	2

Port Arthur District

Name	Collections	Name	Collections
Armstrong, G. C	2	Chapman, D	2
Aro, A	6	Cohen, S	1
Atcheson, J	1	Dainio, J	2
Atkinson, J. F	1	Dale, J	3
Barron, J	1	Deafey, J	1
Basford, J	1	Fiset, A	2
Bell, S	4	Guerard. T	2
Boultbee, R	15	Haard, V	3
Bourke, J	1	Heikkinen, J	9
Bowen, H	5	Henry, P	7
Burton, J	1	Holinshead, A	4

LIST OF CO-OPERATORS—Continued

Port Arthur District—*Concluded*

Name	Collections
Hunter, A. D	1
Kissick, N. L	1
Kouhi, K	2
Macey, L. A	3
Maxwell, G	1
Maxwell, N	2
McMullin, R. C	1
Ostrum, E	5
Prouty, A. R	2
Reid, L. W	27
Reynolds, H. G	6
Rabb, J. E	4
Robinson, L	1
Scalzo, B	1
Stirrett, J. H	2
Strey, A	2
Sutherland, J	1
Sved, H	3
Swift, E	4
Turner, J. F	1

Quinte District

Name	Collections
Bell, J. G	2
Bronson, A. E	1
Bunting, W. R	3
Edwards, W. E	1
Frost, G	1
McRae, E	1
Moore, M	1
Rodgers, N. E	1
Scott, D. A	1
Vance, H. E	1

Rideau District

Name	Collections
Cass, N. D	1
Coppel, H. C	1
Gray, J	1
Griffiths, J. D	1
Hayter, R	2
Hicks, S. D	2
Lambert, R	2
Maxwell, D. E	2
Morrow, Mrs. O	1
Mullin, R. E	1
Parker, G	1
Peters, W. D	2
Smith, J. S	2
Tripp, H. A	4
Walley, G. S	1
Walroth, A. E	8
Welch, W. R	8

Sault Ste. Marie District

Name	Collections
Albert, G	1
Autio, A	5
Bell, E	6
Belton, A	2
Brethour, G	8
Budge, E	2
Campbell, G	11
Christman, J	1
Coulter, J	3
Deas, J. H	1
Dept. Lands and Forests, Gordon Lake	1
Dept. Lands and Forests, Sault Ste. Marie	1
Desjardins, F	2
Doucette, W. J	1
Douglas, S	1
Ducharme, W	3
Ferguson, H	9
Forfar, R. T	1
Gibson, H	1
Gillespie, W. W	1
Godson, H	1
Goodfellow, G	2
Green, H. W	3
Green, L	1
Greenwood, S	1
Hamilton, I	1
Hamilton, J	1
Hazell, J. S	7
Hearst, M. E	1
Huckson, M	1
Hutchinson, C	1
Koski, Tauno	2
Koski, Tenho	19
McHattie, G. C	1
MacKay, I	1
McCaskill, W	1
McClelland, M	9
McDonald, S	1
Orchard, B	8
Pelletier, A	2
Pigeon, L	2
Pratt, W. R	7
Roach, J	8
Roberts, J. N	3
Saari, A	1
Selkirk, J	1
Sewell, S	6
Sherlock, F	1
Smith, J. K	1
Smith, R	1
Stoneman, H. J	1
Storey, J	1
St. Pierre, L. E	7
Thain, J	1
Thain, R	2
Thomas, R	1
Valentine, A	1
Wood, A. A	1
Woodside, T	2
Young, L	1

LIST OF CO-OPERATORS—Continued

Sioux Lookout District

Name	Collections	Name	Collections
Bannatyne, A.	1	Koski, R.	1
Bannatyne, J.	1	Lawson, I.	6
Bannatyne, T.	8	Lukinuk, S. W.	1
Bottle, J.	2	Lyons, J. W.	65
Clark, B.	1	McClanahan, R.	5
Dodds, F. M.	2	McKenna, L. J.	1
Dodds, T.	3	Olsen, A. R.	35
Guertin, E.	7	Scott, J.	2
Harvey, C.	1	Speight, H.	1
Johnston, C.	2	Taylor, W.	15
Johnston, S. N.	20	Whiddon, W.	58
Keesie, R.	13		

Sudbury District

Name	Collections	Name	Collections
Ainslie, B.	1	MacKinnon, G.	1
Allard, J.	2	Massie, N.	1
Avery, D. D.	5	McGown, T. N.	20
Barnes, E.	1	Mulligan, D. A.	1
Belanger, L.	3	Pointing, J. D.	6
Burke, J.	4	Pointing, P. J.	7
Caddell, L.	1	Racey, A. G.	4
Clark, J.	1	Shaw, D. J.	3
Cyr, J.	1	Shea, L.	1
Davis, H. H.	4	Spence, S. D.	23
Dew, E.	2	Staples, C. S.	1
Dewdney, M.	4	Steele, Dr.	1
Dionne, C.	1	Thibault, N.	4
Edwards, T. D.	1	Thibault, J.	1
Goodman, Mrs.	1	Veen, D. M.	1
Hall, F. L.	1	Wetow, W.	1
Hall, J.	1	Wright, G.	1
Jokinen, E.	7		

Temiskaming District

Name	Collections	Name	Collections
Aggis, B.	6	King, W.	1
Arbuckle, E.	9	Martin, W.	1
Bockus, C.	2	McDougall, J. M.	1
Buchan, B.	1	McEwen, J. K.	7
Bulloch, G. W.	35	Peever, A.	3
Colbourne, H. G.	3	Saunders, L. A.	9
Duff, R.	4	Stone, R. W. E.	15
Dufresne, B.	15	Stuart, H.	3
Gardiner, E.	2	Veitch, P.	12
Green, G. R.	1	Wesa, E.	1
Hems, A.	2	Wilson, J.	1
Hill, O.	1	Wilson, W.	2
King, H.	9		

Trent District

Name	Collections	Name	Collections
Beal, A. P.	1	Farley, T. S.	1
Bell, J. G.	1	Kirk, M. D.	1
Bunting, W. R.	2	Linton, G. M.	1
Campbell, J.	2		

White River District

Name	Collections	Name	Collections
Bell, L.	1	Canfield, G.	4
Black, G.	5	Cann, L.	1
Block, A.	1	Coutu, H. E.	4

LIST OF CO-OPERATORS—Continued

White River District—*Concluded*

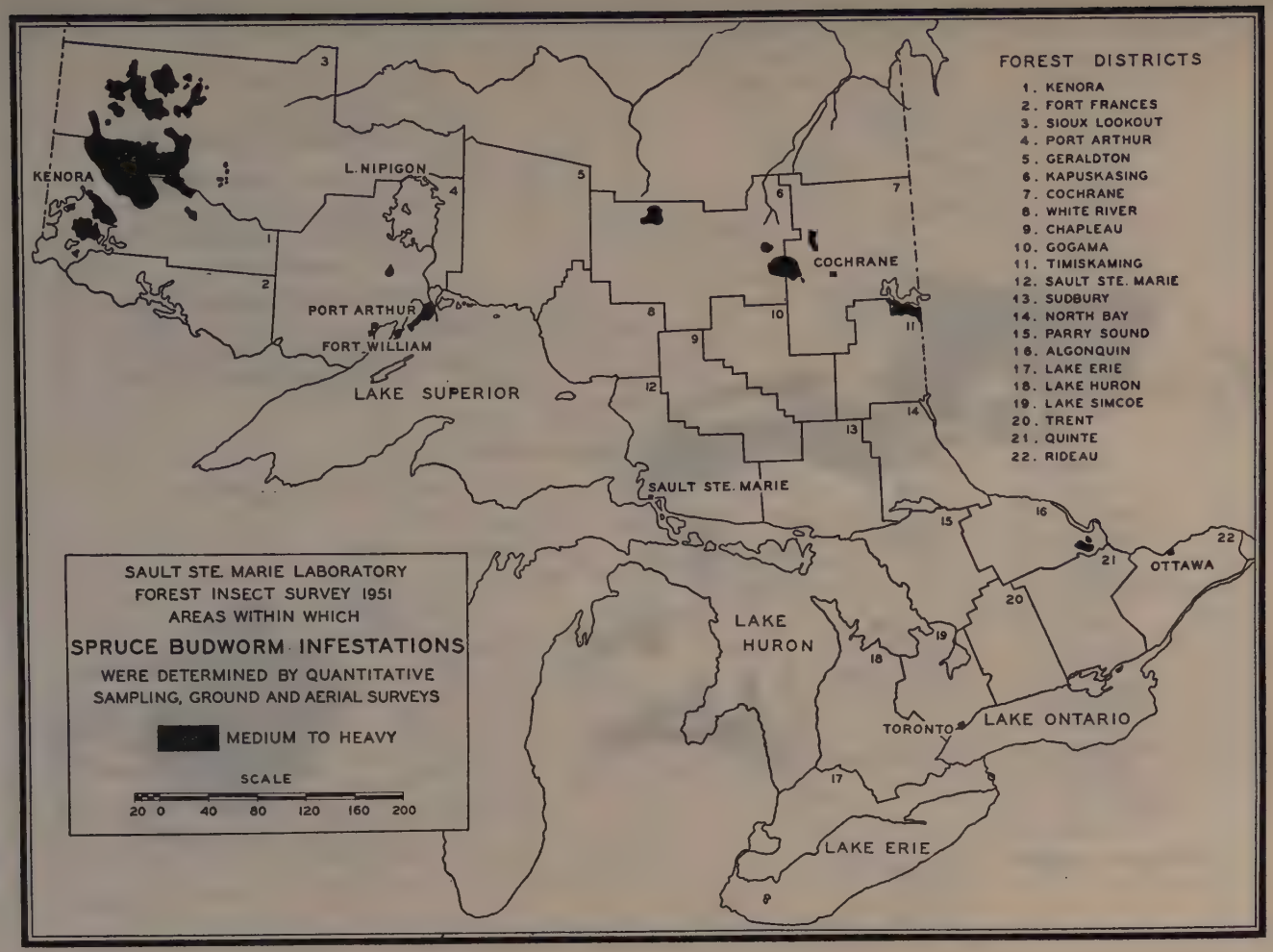
Name	Collections	Name	Collections
Halpenny, E.	1	MacDonald, M. H.	2
Henson, S. W.	4	MacLeod, J.	6
Hewgill, J.	1	McLean, J.	2
Johnstone, B.	6	McWatch, H.	12
Johnstone, W.	4	Niemi, V. E.	3
Kitt, J.	1	Niemi, W.	1
Kitt, W.	2	Padgina, A.	10
Koski, T.	7	Pozzo, E. A.	3
Kwissiwa, L.	3	Sabourin, R.	3
Kwissiwa, P.	3	Saunders, P.	3
Legault, A. J.	7	Skribis, Z.	3
MacDonald, C.	2	Stewart, C.	1
MacDonald, M.	10	Tait, J.	6
MacDonald, M. A.	1	Willis, F.	1

Forest Insect Laboratory—Sault Ste. Marie

Name	Collections	Name	Collections
Anderson, D. C.	2	Green, G.	1
Anderson, J. M.	1	Griffith, K. J.	1
Andren, B.	2	Hall, K. C.	284
Angus, T. A.	1	Harnden, A. A.	478
Beairsto, F. I.	1	Kelley, M. F.	3
Belcher, J.	272	Lynn, D. F.	345
Belyea, R. M.	1	Lyons, L.	1
Blais, J. R.	3	MacDonald, J. E.	174
Bond, E. J.	36	MacGillivray, D. G.	261
Bricault, F. A.	415	MacLeod, L. S.	504
Buchan, P. E.	322	McDonald, A. G.	3
Burk, J. M.	10	McGugan, B. M.	105
Bussineau, J. M.	389	McPhee, H. G.	393
Cady, S.	3	Miller, W. J.	381
Cameron, J. M.	1	Nadeau, R. W.	1
Campbell, I.	5	Nairn, L.	17
Cawthray, W.	1	Prebble, M. L.	1
Clinton, E. O.	247	Rhodes, J.	1
DuFresne, C.	4	Rose, A. H.	1
Elliott, K. R.	5	Rose, A. L.	327
Ferguson, B.	1	Sillers, R. W.	221
Fettes, J. J.	1	Sippell, W. L.	24
Foster, H. R.	427	Thomas, J. B.	2
Fraser, D. A.	1	Thomson, H.	1
Fremlin, L. E.	3	Thorp, J. C.	230
Gardiner, L.	5	Wallace, D. R.	43
Ghent, A. W.	1	Watson, W. Y.	34

Dominion Entomological Laboratory—Ottawa

Name	Collections	Name	Collections
Charbonneau, J. C.	235	Fleming, H. S.	69
Danard, A. S.	474	Haliburton, W.	22
Donaldson, A. G.	366	Lewis, G. G.	21
DuBreuil, R. J.	224	Raizenne, H.	5


FOREST DISTRICTS
1. KENORA
2. FORT FRANCES
3. SIOUX LOOKOUT
4. PORT ARTHUR
5. GERALDTON
6. KAPUSKASING
7. COCHRANE
8. WHITE RIVER
9. CHAPLEAU
10. GOGAMA
11. TIMISKAMING
12. SAULT STE. MARIE
13. SUDBURY
14. NORTH BAY
15. PARRY SOUND
16. ALGONQUIN
17. LAKE ERIE
18. LAKE HURON
19. LAKE SIMCOE
20. TRENT
21. QUINTE
22. RIDEAU
KENORA
L. NIPIGON
PORT ARTHUR
FORT WILLIAM
LAKE SUPERIOR
COCHRANE
SAULT STE. MARIE
OTTAWA
LAKE HURON
TORONTO
LAKE ONTARIO
LAKE ERIE
SAULT STE. MARIE LABORATORY
FOREST INSECT SURVEY 1951
AREAS WITHIN WHICH
SPRUCE BUDWORM INFESTATIONS
WERE DETERMINED BY QUANTITATIVE
SAMPLING, GROUND AND AERIAL SURVEYS
MEDIUM TO HEAVY
SCALE
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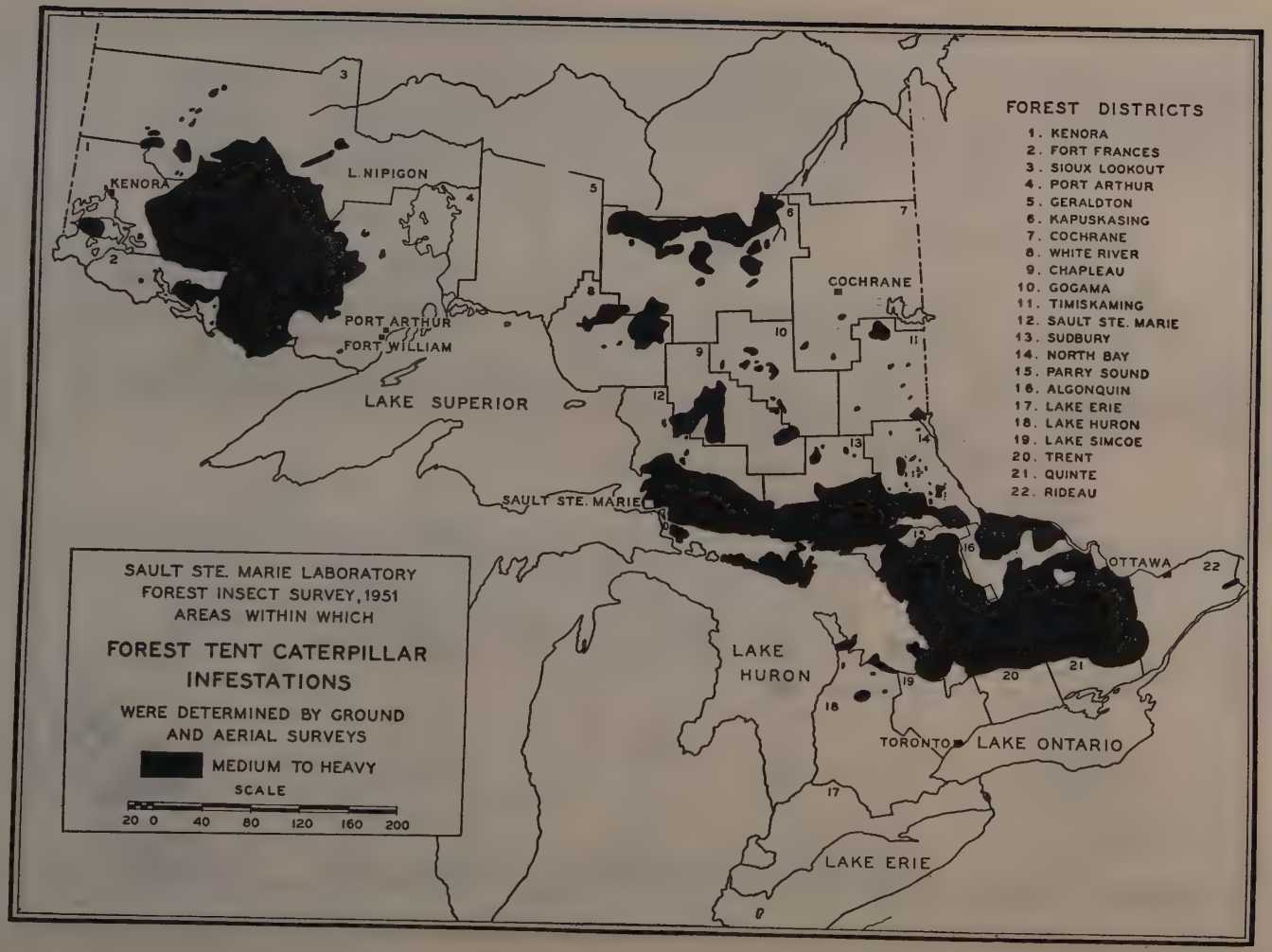
FOREST DISTRICTS
1. KENORA
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6. KAPUSKASING
7. COCHRANE
8. WHITE RIVER
9. CHAPLEAU
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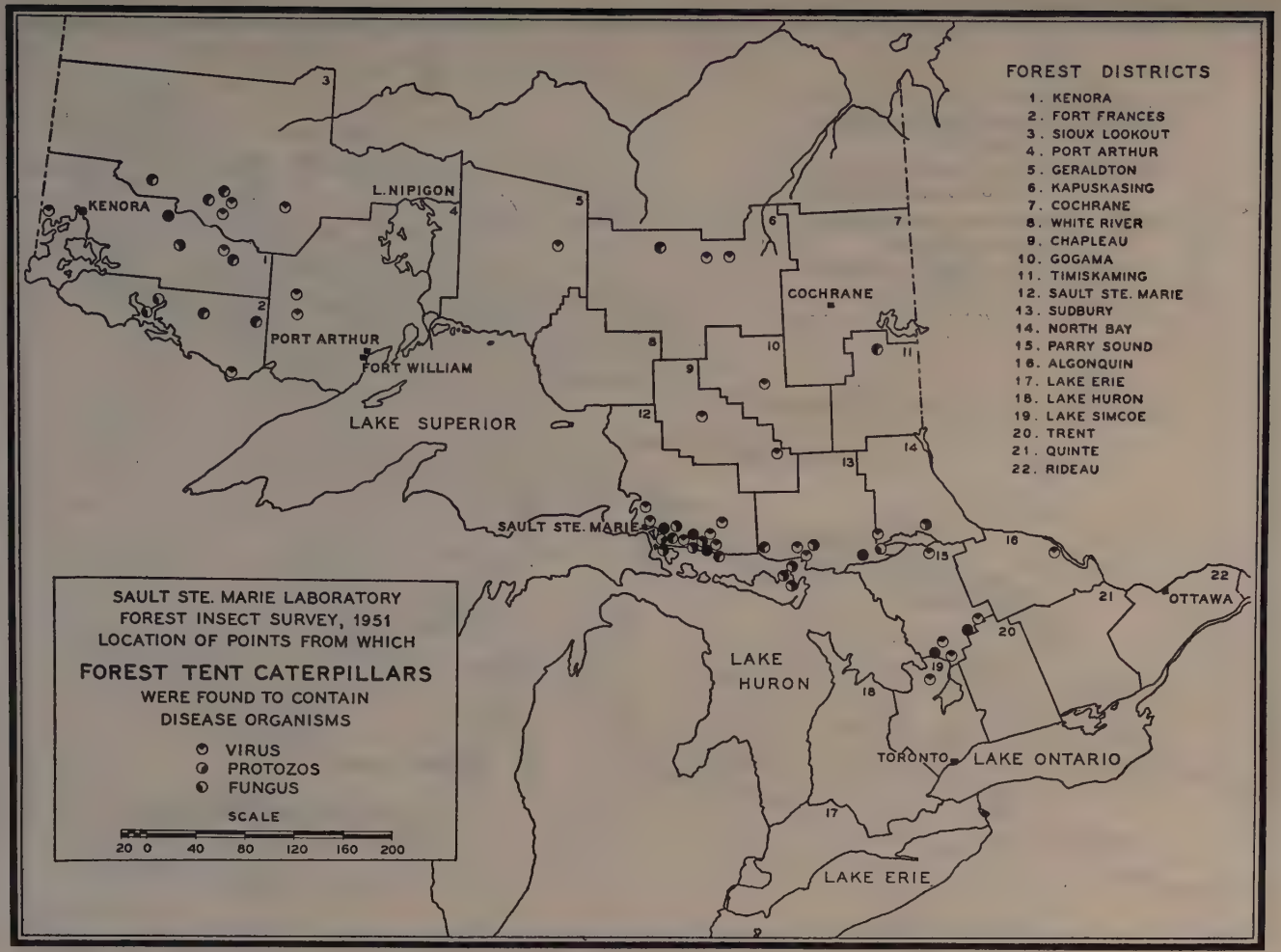
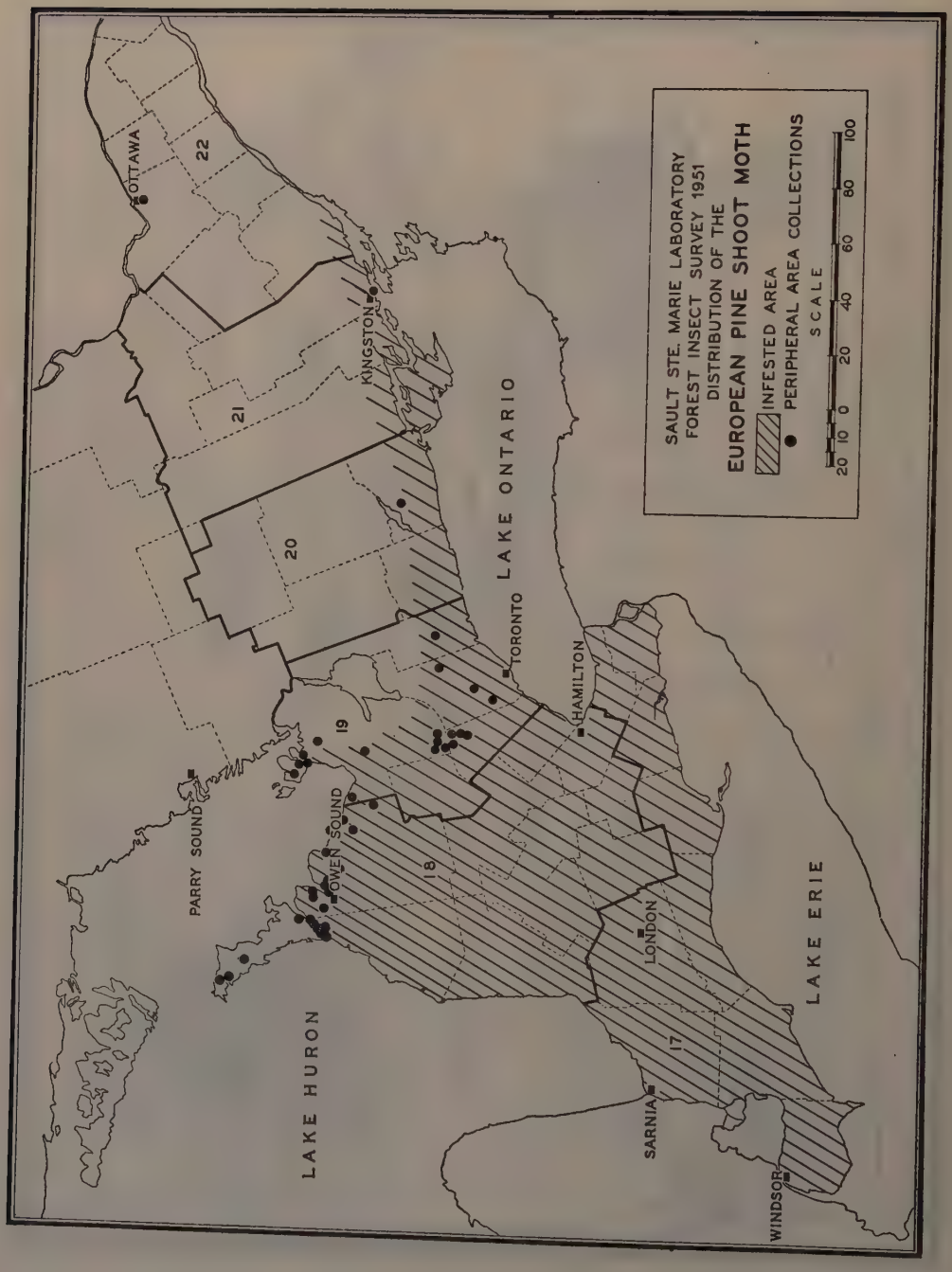
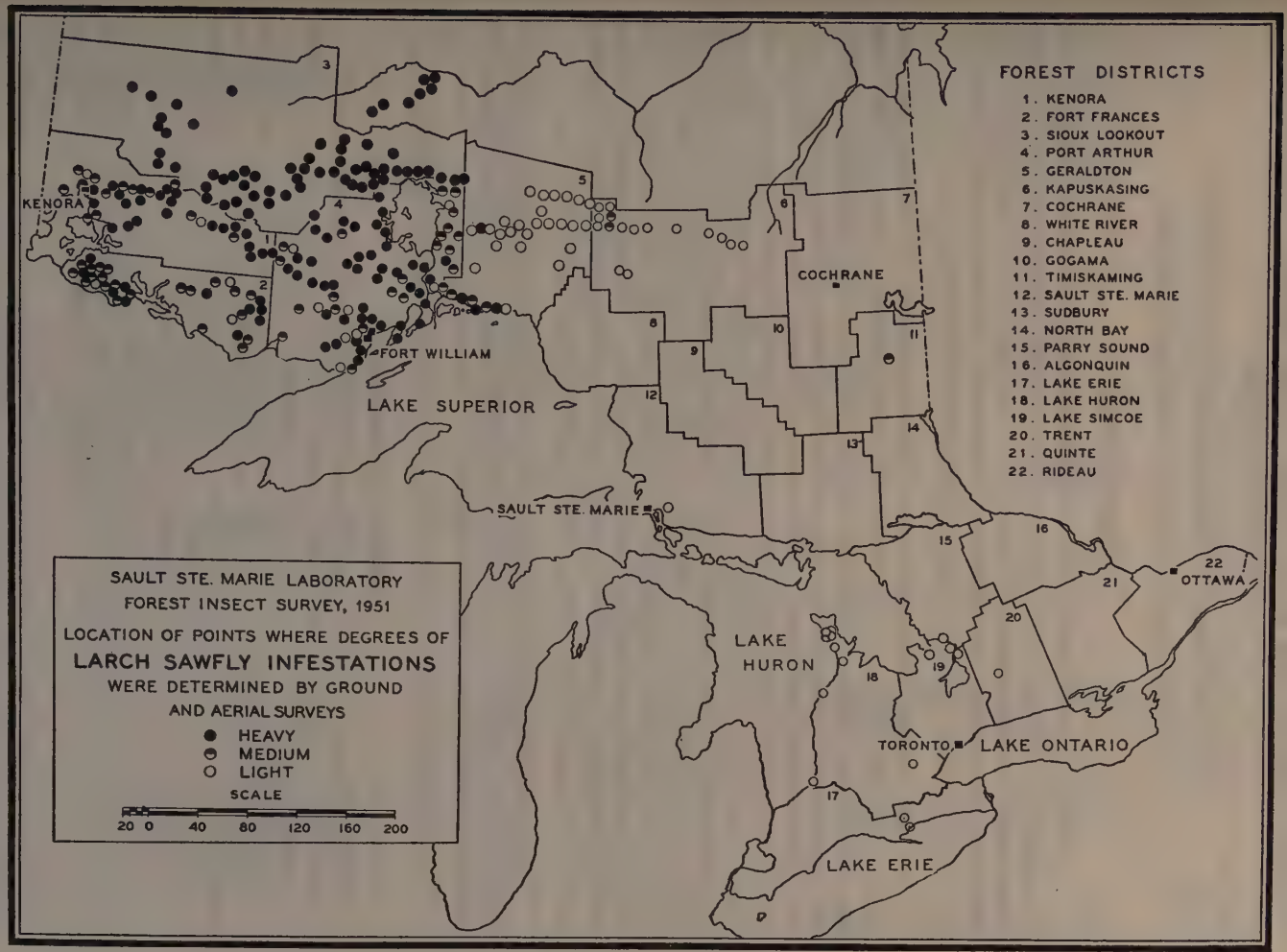
12. SAULT STE. MARIE
13. SUDBURY
14. NORTH BAY
15. PARRY SOUND
16. ALGONQUIN
17. LAKE ERIE
18. LAKE HURON
19. LAKE SIMCOE
20. TRENT
21. QUINTE
22. RIDEAU
KENORA
L. NIPIGON
PORT ARTHUR
FORT WILLIAM
LAKE SUPERIOR
COCHRANE
SAULT STE. MARIE
OTTAWA
LAKE HURON
TORONTO
LAKE ONTARIO
LAKE ERIE
SAULT STE. MARIE LABORATORY
FOREST INSECT SURVEY, 1951
AREAS WITHIN WHICH
FOREST TENT CATERPILLAR
INFESTATIONS
WERE DETERMINED BY GROUND
AND AERIAL SURVEYS
MEDIUM TO HEAVY
SCALE
20 0 40 80 120 160 200


FOREST DISTRICTS
1. KENORA
2. FORT FRANCES
3. SIOUX LOOKOUT
4. PORT ARTHUR
5. GERALDTON
6. KAPUSKASING
7. COCHRANE
8. WHITE RIVER
9. CHAPLEAU
10. GOGAMA
11. TIMISKAMING
12. SAULT STE. MARIE
13. SUDBURY
14. NORTH BAY
15. PARRY SOUND
16. ALGONQUIN
17. LAKE ERIE
18. LAKE HURON
19. LAKE SIMCOE
20. TRENT
21. QUINTE
22. RIDEAU
KENORA
L. NIPIGON
PORT ARTHUR
FORT WILLIAM
LAKE SUPERIOR
COCHRANE
SAULT STE. MARIE
OTTAWA
LAKE HURON
TORONTO
LAKE ONTARIO
LAKE ERIE
SAULT STE. MARIE LABORATORY
FOREST INSECT SURVEY, 1951
LOCATION OF POINTS FROM WHICH
FOREST TENT CATERPILLARS
WERE FOUND TO CONTAIN
DISEASE ORGANISMS
VIRUS
PROTOZOS
FUNGUS
SCALE
20 0 40 80 120 160 200


SAULT STE. MARIE LABORATORY
FOREST INSECT SURVEY 1951
DISTRIBUTION OF THE
EUROPEAN PINE SHOOT MOTH
INFESTED AREA
PERIPHERAL AREA COLLECTIONS
SCALE
20 10 0 20 40 60 80 100
LAKE HURON
LAKE ONTARIO
LAKE ERIE
OTTAWA
KINGSTON
TORONTO
HAMILTON
LONDON
SARNIA
WINDSOR
PARRY SOUND
OWEN SOUND
17
18
19
20
21
22


FOREST DISTRICTS
1. KENORA
2. FORT FRANCES
3. SIOUX LOOKOUT
4. PORT ARTHUR
5. GERALDTON
6. KAPUSKASING
7. COCHRANE
8. WHITE RIVER
9. CHAPLEAU
10. GOGAMA
11. TIMISKAMING
12. SAULT STE. MARIE
13. SUDBURY
14. NORTH BAY
15. PARRY SOUND
16. ALGONQUIN
17. LAKE ERIE
18. LAKE HURON
19. LAKE SIMCOE
20. TRENT
21. QUINTE
22. RIDEAU
KENORA
FORT WILLIAM
LAKE SUPERIOR
COCHRANE
SAULT STE. MARIE
LAKE HURON
TORONTO
LAKE ONTARIO
OTTAWA
LAKE ERIE
SAULT STE. MARIE LABORATORY
FOREST INSECT SURVEY, 1951
LOCATION OF POINTS WHERE DEGREES OF
LARCH SAWFLY INFESTATIONS
WERE DETERMINED BY GROUND
AND AERIAL SURVEYS
HEAVY
MEDIUM
LIGHT
SCALE
20 0 40 80 120 160 200

PROVINCES OF MANITOBA AND SASKATCHEWAN
FORESTED AREA

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INTRODUCTION

Activity of most forest insects commenced at the normal time in 1951. Temperatures, however, were below normal during the summer, causing prolonged development of some species. There was a marked increase in the number of collections received by the Winnipeg Laboratory. A total of 4,917 collections was received, which was 309 more than in the previous year.

In 1951, several important forest insects increased in numbers and were more widely distributed in Manitoba and Saskatchewan. Larvae of the forest tent caterpillar, *Malacosoma disstria* Hbn., a webworm on jack pine, *Tetralopha* sp., a pine scale, *Toumeyella* sp., grey willow leaf beetle, *Galerucella decora* (Say), and black-headed budworm, *Acleris variana* (Fern.), were more numerous. Some of the insects listed above caused serious damage in both provinces. The spruce budworm, *Choristoneura fumiferana* (Clem.), jack-pine budworm, *Choristoneura* sp., and red-pine sawfly, *Neodiprion nanulus* Schedl, which were absent in Saskatchewan in 1950, were present in that Province in 1951. The spotless fall webworm, *Hyphantria textor* Harr., was the only important insect that was absent again in Saskatchewan in 1951. The only species showing marked decreases in population in 1951 were the balsam-fir sawfly, *Neodiprion abietis* (Harr.), and the red-pine sawfly, *Neodiprion nanulus* Schedl.

More coniferous trees were attacked by forest insects of economic importance than in the previous year. Tamarack was still the most heavily defoliated tree species in Manitoba and Saskatchewan.

The number of collections made from each tree species was as follows:—

Coniferous host	Collections
Balsam fir	59
Black spruce	167
Jack pine	777
Scotch pine	3
Siberian larch	16
Spruce (species not given)	19
Tamarack	700
White spruce	625
Total	2,366

Deciduous host	Collections
Bur oak	33
Choke cherry	219
Dogwood	10
Green Ash	11
Hazel	10
Manitoba maple	22
Pin cherry	16
Poplar (all species)	1,101
Saskatoon	12
Speckled alder	150
Water birch	3
White birch	398
White elm	40
Willow (all species)	397
Others	39
Total	2,461

Miscellaneous and unknown hosts..... 90

Grand Total—4,917

The accompanying table lists the insects by species, in order of importance, and indicates their abundance in the samples, with deviations from 1950 values.*

Insects	Number of Larval Collections	Total Number of Larvae	Larvae per Collection	Larvae per Tree 1951	Deviation from 1950
Larch sawfly	557	20,485	36·8	8·2	−0·6
Forest tent caterpillar	21	808	38·5	7·5	+5·4
Jack-pine budworm	144	4,366	30·3	5·5	+5·3
Large aspen tortrix	238	1,697	7·1	1·6	+0·9
Spruce budworm	92	660	7·2	1·3	+1·1
Grey willow leaf beetle	91	4,224	46·4	12·5	+1·3
Pitch nodule maker	192	333	1·8	0·3	0·0
American poplar beetle	87	1,938	22·3	4·5	−2·7
Spruce needleworm	65	144	2·2	0·5	+0·2
Balsam-fir sawfly	30	82	2·7	0·5	−2·1
Yellow-headed spruce sawfly	226	1,217	5·4	1·0	−0·1
Red-pine sawfly	12	43	3·6	0·7	−2·9
Green-headed spruce sawfly	172	340	2·0	0·4	+0·1
Birch tube-maker	22	130	5·9	1·6	+1·0
Birch sawfly	6	30	5·0	1·2	−0·5
Anoplonyx luteipes (Cress.)	151	414	2·7	0·6	−0·2
Black-headed budworm	65	86	1·3	0·3	+0·1
Hemlock looper	6	7	1·2	0·3	+0·1
False hemlock looper	9	9	1·0	0·2	0·0

The role that micro-organisms play in the control of forest insects has been studied more intensively. In co-operation with the Laboratory of Insect Pathology at Sault Ste. Marie, the Winnipeg Laboratory undertook, for the first time, the preliminary examination of insects suspected of being diseased. Over 2,000 specimens, involving more than 100 species, were examined. Although the diagnoses of a number of the diseased specimens have not been completed, certain pertinent information has been obtained. The following are some of the disease determinations received from the Laboratory of Insect Pathology, Sault Ste. Marie: *Beauveria globulifera* (Speg.) on *Choristoneura* sp., *C. fumiferana* (Clem.), *Malacosoma lutescens* (N. & D.), *M. disstria* Hbn., *M. americanum* (F.), and *Archips conflictana* (Wlk.); *Beauveria bassiana* (Bals.) on *Pristiphora erichsonii* (Htg.); *Isaria farinosa* (Dicks) on *C. fumiferana* (Clem.), and *Pristiphora erichsonii* (Hgt.); *Fusarium* sp. on *M. lutescens* (N. & D.), and *C. fumiferana* (Clem.).

IMPORTANT INSECTS

Larch sawfly, *Pristiphora erichsonii* (Htg.).—Many tamarack stands in Manitoba and Saskatchewan were severely defoliated again by the larch sawfly in 1951. The prolonged outbreak of this insect in both provinces has still not caused any serious tree mortality. However, needle and terminal growth were generally sparse and short on trees that have been defoliated repeatedly. It is reported that in several areas mice and shrews appeared to have destroyed more larch sawfly cocoons than in previous years. Moderate to severe defoliation was general in the western and northern districts of Manitoba, while light to moderate infestations prevailed in the eastern and southern districts. In Saskatchewan, moderate to severe damage occurred throughout the Hudson Bay and Prince Albert districts, while defoliation was light in the Meadow Lake and northern districts.

In Manitoba, south of the Winnipeg River to the United States border, the infestations were light to moderate with the occasional area of severe defoliation. The areas between Whitemouth and Moose lakes, and from East Braintree to Waugh, were severely attacked. Tamarack stands were severely defoliated again between East Braintree and Falcon Lake, in the Whiteshell Forest Reserve.

* Includes only quantitative samples.

Light infestations south of Pine Falls were attributed to the presence of surface water in many of the swamps. The well-drained swamps between Murray Hill and Wood Siding, on the other hand, were severely defoliated.

East of Lake Winnipeg, defoliation was light to moderate north of the Winnipeg River to Gunisao River, and moderate to severe north to God's River. Many of the swamps showed more severe defoliation along the drier borders than in the flooded centres.

In the Interlake Area, the infestation was generally light to moderate. Stands around Riverton were severely defoliated again in 1951.

In western Manitoba, tamarack stands were generally moderately to severely defoliated. The light infestation in the central portion of Riding Mountain National Park remained unchanged in 1951. Defoliation, however, increased from moderate to severe in the western portion, and from light to moderate in the eastern portion of the Park. North of Riding Mountain National Park to the Overflowing River, including the Duck Mountain and Porcupine Forest reserves, defoliation was severe. Poor needle growth was observed in many tamarack swamps in the eastern part of the Porcupine Forest Reserve.

In the northern district of Manitoba damage ranged from light to severe. North of the Overflowing River to the Cormorant Forest Reserve and Sturgeon Landing, defoliation was moderate to severe. An aerial survey by R. Ross, Manitoba Forest Service, revealed that tamarack stands continued to be severely defoliated in a triangular region bounded by Cormorant, Thicket Portage, and Norway House. Infestations in the area bounded by Cranberry Portage, Sherridon, Lynn Lake, and Flin Flon were generally light to moderate with few trees severely defoliated. Beyond Pikwitonei to Kettle Rapids few larvae were present.

Populations of the larch sawfly in Saskatchewan remained unchanged in the eastern part, but increased in the western part of the Province. Stands were moderately defoliated at Madge Lake in the Duck Mountain Provincial Park, and at Pelly. Damage was severe throughout the Porcupine Provincial Forest and along the eastern and southern boundary of the Pasquia Provincial Forest. Some of the smaller trees in the Porcupine Provincial Forest were completely stripped of foliage. In the central portion of the Pasquia Provincial Forest, H. G. Pond, Saskatchewan Department of Natural Resources, observed only light defoliation in tps. 48, 49, and 50, rgs. 4, and 5, W. 2nd mer. In Amisk Lake Provincial Forest, infestations were light.

West of the Pasquia Provincial Forest to Shellbrook, including the Fort a la Corne and Nisbet Provincial forests, defoliation was severe. North of this area the larch sawfly caused light to moderate defoliation in Nipawin Provincial Park, Prince Albert National Park, and Emma Lake and Candle Lake Provincial forests. Farther west, moderate infestations occurred in the Big River Provincial Forest and at Green Lake. Defoliation was generally very light in the Meadow Lake and Bronson Provincial forests; the only conspicuous feeding observed was at St. Cyr.

Light populations were reported from the northern district. The only moderate infestation occurred on the east shore of Lac la Ronge. The most northerly collection in Saskatchewan came from south of Ile a la Crosse in Township 73. These insects were collected by W. MacNeill, Saskatchewan Department of Natural Resources.

The accompanying table, shows the relative abundance of the larch sawfly and two commonly associated insects received:—

Month	Total Number of Larvae	Larch Sawfly		*Anoplonyx luteipes* (Cress.)		Green Larch Looper	
		Larvae	Per cent	Larvae	Per cent	Larvae	Per cent
June	1,496	1,480	98·9	16	1·1	0	0·0
July	12,490	12,348	98·8	133	1·1	9	0·1
August	7,268	6,588	90·6	181	2·5	499	6·9
September	227	69	30·4	92	40·5	66	29·1
Total	21,481	20,485	79·7	422	11·3	574	9·0

The following table shows the relative abundance of the larch sawfly in collections from tamarack during the period of larval activity with deviations from 1950 values:—

Region	Collections from Tamarack	Per cent Containing Larch Sawfly	Deviation from 1950
Manitoba			
Eastern	70	98·6	+ 3·0
Central	174	92·0	− 1·8
Western	36	91·7	+ 2·8
Saskatchewan			
Eastern	91	93·2	− 5·0
Central	165	88·5	+ 8·4
Western	69	92·0	+10·8

	Collections	Reports
Manitoba	299	45
Saskatchewan	350	61

Forest Tent Carterpillar, *Malacosoma disstria* Hbn.—Several infestations of this insect were present in Manitoba and Saskatchewan in 1951. Although they are still confined to relatively small areas, the sudden increase in populations suggests the possibility of a widespread outbreak in 1952.

In southeastern Manitoba, white poplar and its understory were completely defoliated in tps. 3, 4, and 5, rge. 17, E. P. mer. Three separate local areas of white poplar in tps. 3, and 4, rges. 15, and 16, E. P. mer., were also completely defoliated. In the Whiteshell Forest Reserve, a small but severe infestation around the Big Whiteshell-Crow Duck Lake Portage completely defoliated all deciduous trees. The severe infestation recorded in 1949 on an island in Big Whiteshell Lake continued to decline except in the northern extremity where it remained light to moderate. East of Lake Winnipeg the infestations previously reported at Quesnel and Sasaginnigak lakes continued to subside. Limited air travel prevented a survey being made of the areas north of Sasaginnigak Lake that were reported as severely attacked in 1950.

Small collections of this insect were also obtained from the following points in southeastern Manitoba: Caddy Lake, Rennie, Lac du Bonnet, and Fort Garry. Two collections were made in the northern district of Manitoba, one at Reader Lake and the other at Sturgeon Landing.

The forest tent caterpillar was found associated with the large aspen tortrix, *Archips conflictana* (Wlk.)., north of Glaslyn (tp. 54, rges. 16, and 17, W. 3rd mer.) in western Saskatchewan. Both insects caused severe defoliation to all deciduous trees in the area, and occasionally were found feeding on the new growth of white spruce.

From Green Lake northeast as far as Beaupre Lake, the forest tent caterpillar was generally distributed, but only "islands" of white poplar were severely defoliated. A small infestation northeast of Prince Albert National Park along Highway No. 2, caused severe defoliation in sec. 36, tp. 57, rge. 27, W. 2nd mer. Light defoliation occurred in sec. 24, tp. 57, rge. 27, and secs. 30, and 31, tp. 57, rge. 26, W. 2nd mer.

In order to predict the extent of forest tent caterpillar infestations in 1952, an egg survey was completed in the fall of 1951 in the areas infested by this insect and in areas that were adjacent to them. At each sample station three trees were thoroughly examined for egg clusters. A number of these egg clusters was collected for study during the winter, to determine their size, degree of parasitism, and larval mortality from other causes.

The following table gives the average number of egg clusters per tree found in the areas examined, and the probable degree of defoliation expected in 1952.

EGG SURVEY—FOREST TENT CATERPILLAR

Place	Location			Average d.b.h.	Average Height	Average Number of Egg Clusters	Number of Sample Stations	Forecast* for 1952
	Tp.	Rge.	Mer.					
Manitoba—								
Middlebro	1	16	E.P.	3·0	16·0	6·7	1	L-M
Middlebro	1	15	E.P.	2·7	20·0	1·7	1	L-M
Sprague	1	14	E.P.	3·0	20·0	1·0	1	L
Moose Lake	2	14	E.P.	2·8	21·3	5·5	2	L-M
Moose Lake	3	16	E.P.	2·7	19·6	13·2	4	M-H
Moose Lake	3	17	E.P.	3·0	23·7	36·3	1	H
Moose Lake	2	15	E.P.	2·7	17·0	3·7	1	L-M
Whitemouth Lake	2	13	E.P.	4·7	28·3	1·7	1	L-M
Whitemouth Lake	3	13	E.P.	3·7	25·5	1·5	4	L-M
Whitemouth Lake	4	13	E.P.	4·0	24·0	3·0	1	L-M
Vassar	2	13	E.P.	3·7	21·5	4·1	2	L-M
South Junction	1	13	E.P.	3·7	22·7	2·3	1	L-M
Piney	1	11	E.P.	3·0	21·7	0·0	1	Nil
Piney	1	12	E.P.	4·3	28·0	1·3	1	L-M
Menisino	2	10	E.P.	2·0	13·3	1·3	1	L-M
Sundown	2	9	E.P.	2·7	18·7	0·3	1	L
Caliento	2	8	E.P.	2·0	11·3	0·3	1	L
Stuartburn	2	6	E.P.	2·3	16·7	0·0	1	Nil
Badger	2	11	E.P.	2·7	22·3	0·3	1	L
Garrick	3	11	E.P.	4·0	29·0	1·3	1	L-M
Woodridge	4	10	E.P.	4·0	23·6	0·3	1	L
St. Labre Road	4	11	E.P.	3·7	20·3	0·6	1	L
St. Labre Road	4	12	E.P.	2·8	17·0	1·5	2	L-M
Sandilands F.R.	6	8	E.P.	3·7	16·3	0·0	1	Nil
Sandilands F.R.	7	10	E.P.	2·5	26·6	0·0	1	Nil
Sandilands F.R.	7	11	E.P.	2·3	22·0	0·0	1	Nil
Sandilands F.R.	8	11	E.P.	2·3	26·0	0·7	1	L
Sandilands F.R.	8	11	E.P.	3·7	16·3	0·0	1	Nil
Sandilands F.R.	5	10	E.P.	3·7	23·3	1·0	1	L
Sandilands F.R.	6	9	E.P.	3·0	22·7	0·3	1	L
Dawson Road	7	12	E.P.	2·3	28·7	0·0	1	Nil
Dawson Road	7	13	E.P.	2·5	26·0	1·0	1	L
Marchand	5	9	E.P.	2·5	20·3	0·0	2	Nil
La Broquerie	6	8	E.P.	2·3	16·0	0·3	1	L
Richer	8	9	E.P.	2·1	17·3	0·6	1	L

* H—Heavy defoliation. M—Medium defoliation. L—Light defoliation

EGG SURVEY—FOREST TENT CATERPILLAR—*Continued*

Place	Location			Average d.b.h.	Average Height	Average Number of Egg Clusters	Number of Sample Stations	Forecast* for 1952
	Tp.	Rge.	Mer.					
Manitoba—Concluded								
Richer	8	8	E.P.	2·6	21·3	0·0	1	Nil
Hadashville	9	12	E.P.	2·3	19·7	2·3	1	L-M
Elma	10	12	E.P.	2·7	22·7	0·0	1	Nil
McKinley	8	13	E.P.	2·8	25·3	4·0	1	L-M
East Braintree	7	14	E.P.	2·7	26·6	1·3	1	L-M
Glen	8	15	E.P.	2·3	23·3	0·6	1	L
Falcon Lake	8	15	E.P.	3·0	24·0	3·0	1	L-M
Falcon Lake	8	16	E.P.	3·2	25·0	2·7	2	L-M
Falcon Lake	9	17	E.P.	2·6	23·3	2·6	2	L-M
Caddy Lake	10	17	E.P.	3·0	26·3	0·3	1	L
Red Rock Lake	12	15	E.P.	3·3	20·3	2·0	1	L-M
Brereton Lake	11	15	E.P.	3·3	20·0	3·7	1	L-M
Betula Lake	13	15	E.P.	4·3	35·0	2·7	1	L-M
Heart Lake	13	14	E.P.	3·8	25·5	0·5	2	L
Big Whiteshell Ptge	13	16	E.P.	2·4	24·7	21·5	13	H
Rennie	10	14	E.P.	2·3	17·0	3·3	1	L-M
Whitemouth	11	12	E.P.	1·9	22·6	0·0	1	Nil
Seddon's Corner	12	10	E.P.	2·5	21·0	0·0	2	Nil
Pointe du Bois	15	12	E.P.	3·0	22·5	0·7	2	L
Pointe du Bois	16	13	E.P.	2·0	22·0	0·0	1	Nil
Pointe du Bois	16	14	E.P.	3·3	25·3	0·7	1	L
Pointe du Bois	15	14	E.P.	2·3	16·0	0·3	1	L
Lac du Bonnet	14	10	E.P.	2·7	17·0	0·2	2	L
Aneda	13	9	E.P.	4·0	25·7	0·3	1	L
Telford	10	16	E.P.	3·0	26·0	5·3	1	L-M
Stead	17	8	E.P.	3·3	26·0	0·0	1	Nil
Gull Lake	16	7	E.P.	2·0	16·7	0·0	1	Nil
Grand Marais	18	7	E.P.	2·3	24·3	0·0	1	Nil
Belair	19	7	E.P.	2·6	21·5	0·0	2	Nil
Saskatchewan—								
Glaslyn	50	16	W3rd	2·1	19·0	0·0	1	Nil
Glaslyn	51	17	W3rd	2·5	23·7	0·0	1	Nil
Midnight Lake	52	17	W3rd	4·6	39·7	1·0	1	L
Midnight Lake	53	17	W3rd	3·8	35·8	1·8	2	L-M
Midnight Lake	54	17	W3rd	4·7	43·6	18·1	5	M-H
Meadow Lake	54	16	W3rd	3·7	40·8	8·7	4	L-M
Meadow Lake	55	17	W3rd	4·1	40·3	1·5	2	L-M
Meadow Lake	56	17	W3rd	5·4	47·0	2·0	1	L-M
Meadow Lake	57	17	W3rd	4·2	46·0	0·3	1	L
Meadow Lake	58	17	W3rd	4·3	45·0	1·3	1	L-M
Meadow Lake	59	16	W3rd	3·0	28·0	0·3	1	L
Pegasus	60	17	W3rd	2·6	32·3	0·3	1	L
Pegasus	60	18	W3rd	2·8	24·3	0·7	1	L
Dorintosh	61	18	W3rd	3·6	40·3	0·0	1	Nil
Eidred	53	7	W3rd	3·1	36·7	0·0	1	Nil
Dumble	54	7	W3rd	3·2	35·0	0·0	1	Nil
Bodmin	55	7	W3rd	2·9	34·0	0·0	1	Nil
Big River	56	7	W3rd	3·5	32·3	0·5	2	L
Big River	58	8	W3rd	3·3	31·0	0·8	2	L
Big River	58	9	W3rd	4·8	55·5	1·0	1	L
Big River	59	9	W3rd	4·5	52·3	1·0	1	L
Big River	59	10	W3td	4·6	44·0	2·0	1	L-M
Green Lake	60	11	W3rd	5·2	59·2	7·9	4	L-M
Green Lake	61	11	W3rd	5·4	57·3	9·3	1	L-M
Green Lake	61	12	W3rd	5·4	54·0	3·3	1	L-M
Green Lake	61	13	W3rd	4·0	3·95	1·0	2	L
St. Cyr	61	14	W3rd	3·0	30·3	0·3	1	L
St. Cyr	61	15	W3rd	3·6	34·0	2·0	1	L-M
St. Cyr	60	16	W3rd	3·4	33·3	0·7	2	L
Sled Lake	62	10	W3rd	5·3	57·2	21·1	4	H
Sled Lake	61	9	W3rd	5·1	56·3	37·7	1	H
Sled Lake	62	9	W3rd	4·8	58·7	9·3	1	L-M
Sled Lake	63	9	W3rd	5·2	55·7	8·7	2	L-M
Beaupre Lake	64	9	W3rd	5·2	55·0	0·8	2	L
Beaupre Lake	65	9	W3rd	5·3	57·7	0·0	1	Nil
Prince Albert N.P.	53	1	W3rd	3·4	36·0	0·0	1	Nil
Prince Albert N.P.	54	1	W3rd	3·4	31·7	0·0	1	Nil

* H—Heavy defoliation. M—Medium defoliation. L—Light defoliation.

EGG SURVEY—FOREST TENT CARTERPILLAR—*Concluded*

Place	Location			Average d.b.h.	Average Height	Average Number of Egg Clusters	Number of Sample Stations	Forecast* for 1952
	Tp.	Rge.	Mer.					
Saskatchewan—Concluded								
Prince Albert N.P.	55	1	W3rd	3·6	36·7	0·0	1	Nil
Prince Albert N.P.	56	1	W3rd	3·2	36·5	1·0	2	L
Prince Albert N.P.	57	1	W3rd	4·2	36·0	0·3	1	L
Bittern Creek	57	27	W2nd	3·8	41·9	8·5	6	L-M
Montreal Lake	57	26	W2nd	4·3	43·3	3·0	2	L-M
Montreal Lake	58	26	W2nd	3·2	35·0	0·3	2	L
Montreal Lake	59	25	W2nd	3·8	38·6	3·0	2	L-M
Montreal Lake	60	25	W2nd	5·5	48·7	3·0	1	L-M
Montreal Lake	61	24	W2nd	3·3	23·0	0·3	1	L
Montreal Lake	62	24	W2nd	3·2	38·7	1·0	1	L
Montreal Lake	63	24	W2nd	2·2	18·7	0·0	1	Nil
Montreal Lake	64	24	W2nd	5·1	45·3	4·3	1	L-M
Montreal Lake	65	24	W2nd	4·7	43·0	1·7	2	L-M
Montreal Lake	66	23	W2nd	4·1	45·0	0·0	1	Nil
Montreal Lake	67	23	W2nd	5·0	49·7	1·3	1	L-M
Lac la Ronge	68	23	W2nd	5·4	52·1	0·3	2	L
Lac la Ronge	69	22	W2nd	9·5	81·7	24·3	1	M-H
Lac la Ronge	70	22	W2nd	3·3	30·3	0·3	1	L

* H—Heavy defoliation. M—Medium defoliation. L—Light defoliation.

	Collections	Reports
Manitoba	108	59
Saskatchewan	111	35

Jack-pine Budworm, *Choristoneura* sp.—Distribution of the jack-pine budworm increased in 1951 in Manitoba and Saskatchewan. In 1950 it was present in eastern and central Manitoba, but this year it was found also in western Manitoba and the Prince Albert District of Saskatchewan. Infestations were light except for several small areas in southeastern and central Manitoba that were severely attacked.

In southeastern Manitoba heavy infestations were limited to Belair, Stead, Seddon's Corner, and Milner Ridge. On the other hand, although the jack-pine budworm occurred commonly throughout the Sandilands and Whiteshell Forest reserves, no severe attacks were observed. The only noticeable damage was caused by a light infestation in the central portion of the Sandilands Forest Reserve.

The insect caused light damage east of Lake Winnipeg, from the Winnipeg River north to the Bloodvein River. Limited aerial transportation prevented a more extensive survey north of the Bloodvein River.

In the Interlake Area, the infestation at Rosenburg increased in severity with jack-pine regeneration suffering the greatest defoliation. The old infestation south of Gypsumville abated in 1951.

Only traces of budworm feeding were observed in western Manitoba in Riding Mountain National Park, and near Cowan.

For the first time since 1948, jack-pine budworm was collected in Saskatchewan. Stands were lightly attacked in the Home, Red Rock, and Round Lake blocks of Nisbet Provincial Forest and in the western part of Fort a la Corne Provincial Forest. Jack-pine budworm larvae were collected in the Northern District (tp. 73, rge. 12, W. 3rd mer.) by W. MacNeill, Saskatchewan Department of Natural Resources.

The following table shows the relative abundance of the jack-pine budworm in collections from jack pine during the period of larval activity, with deviations from 1950 values:—

Region	Collections from Jack pine	Per cent Containing Jack-pine Budworm	Deviation from 1950
Manitoba			
Eastern	372	22·8	−40·3
Central	29	82·8	+58·7
Western	163	6·1	+ 6·1
Saskatchewan—			
Eastern	30	0·0	0·0
Central	149	16·8	+16·8
Western	20	5·0	+ 5·0

	Collections	Reports
Manitoba	132	44
Saskatchewan	34	4

Large Aspen Tortrix, *Archips conflictana* (Wlk.).—The large aspen tortrix occurred generally throughout the two provinces. Appreciable defoliation, however, was limited to northern Manitoba, and the Glaslyn area in western Saskatchewan.

The intensity of the infestation in northern Manitoba diminished greatly in 1951 but the area attacked increased. The infestations in the area included within Lynn Lake, Westray, Wabowden, and the Saskatchewan boundary in 1950 has now spread 8 miles south of Westray and east to Thicket Portage. Defoliation through the entire region was light, except for a severe infestation at Sherridon and a moderate infestation at Mistik Lake.

Defoliation was negligible in the old infestation at Madge Lake in eastern Saskatchewan. North of Usherville, white poplar was lightly to moderately infested.

The infestation around Glaslyn continued to flourish in 1951. The area defoliated by the large aspen tortrix has spread south to Jackfish Lake, northwest to Hartwell, and west to Frenchman's Butte. Light to moderate defoliation was general in this area, with scattered "pockets" of severe and moderate to severe infestations. Severe defoliation was recorded around Brightsand Lake, south of Turtle Lake, and north of Helene Lake. Moderate to severe defoliation was observed in an area bounded on the east by Cater, on the south by tp. 49°, rge. 17, W. 3rd mer., on the northwest by Hartwell and on the north by Turtle Lake and Glaslyn.

The following table shows the relative abundance of the large aspen tortrix in collections from poplar during the period of larval activity, with deviations from 1950 values:—

Region	Collections from Poplar	Per cent Containing Large Aspen Tortrix	Deviation from 1950
Manitoba—			
Eastern	120	6·7	+ 5·3
Central	17	11·8	+ 8·8
Western	295	26·1	−11·1
Saskatchewan—			
Eastern	124	35·5	+10·8
Central	64	39·1	+16·2
Western	163	50·9	+ 6·5

	Collections	Reports
Manitoba	135	72
Saskatchewan	202	45

Spruce Budworm, *Choristoneura fumiferana* (Clem.).—This insect was more widely distributed in 1951 than in 1950. Populations in previously infested areas, however, remained at about the same level as in 1950.

In southeastern Manitoba, very light defoliation was observed at Moose Lake and South Junction.

Low budworm populations were general north of the Trans-Canada Highway to Sasaginnigak Lake in eastern Manitoba. Limited air transportation in 1951 prevented an aerial survey of northeastern Manitoba.

In the Interlake Area, light defoliation was observed in an area bounded by Gypsumville, Moosehorn, Arborg, and Riverton.

In the Spruce Woods Forest Reserve, the level of the spruce budworm remained about the same as in 1950. Stands of white spruce were lightly defoliated by the spruce budworm and the spruce needleworm, *Dioryctria reniculella* (Grt.). Several small areas in the east block of the Reserve were heavily defoliated for the first time in many years.

In western Manitoba, traces of budworm feeding were observed in Riding Mountain National Park, Duck Mountain Forest Reserve, and the Porcupine Forest Reserve. Ornamental spruce in Swan River was lightly defoliated. A number of empty budworm pupal cases, collected from white spruce and balsam fir, indicate the presence of this insect near Sturgeon Landing on the Manitoba-Saskatchewan boundary. Unfortunately, it was not possible to obtain more information on this area.

After an absence of several years the spruce budworm reappeared in Saskatchewan. In 1951 a few larvae were collected near Veillardville in the Hudson Bay District and in Prince Albert National Park (sec. 1, tp. 58, rge. 2, W. 3rd mer.).

The following table shows the relative abundance of the spruce budworm in collections from spruce and balsam during the period of larval activity, with deviations from 1950 values:—

Region	Collections from Spruce and Balsam	Per Cent Containing Spruce Budworm	Deviation from 1950
Manitoba—			
Eastern	194	41·8	+24·5
Central	39	28·2	+ 5·1
Western	309	3·9	+ 2·9
Saskatchewan—			
Eastern	95	3·1	+ 3·1
Central	122	0·1	+ 0·1
Western	66	0·0	0·0

	Collections	Reports
Manitoba	102	19
Saskatchewan	4	4

Grey Willow Leaf Beetle, *Galerucella decora* (Say).—In 1951 the grey willow leaf beetle caused more conspicuous damage in Manitoba than in Saskatchewan. Willow stands in eastern Manitoba were severely skeletonized north of the Winnipeg River to God's Lake. The infestations subsided in southeastern Manitoba with the only severe damage observed occurring north of Sprague and in scattered areas throughout the Whiteshell Forest Reserve. Only light to moderate activity occurred between Sprague and South Junction, an area that was severely infested in 1950.

Populations of this insect increased greatly in the Interlake Area. Severe infestations occurred along the east shore of Lake Manitoba from St. Laurent north to Gypsumville. Moderate to severe infestations were noted in an area enclosed by Eriksdale, Poplarfield, and Hodgson. In the vicinity of Arborg and Riverton, willow stands were only lightly to moderately attacked.

The grey willow leaf beetle was not so abundant in the Western District of Manitoba. In the Northern District of the Province the infestation appeared to have increased, causing severe skeletonizing at Halcrow Lake and Prospector.

In Saskatchewan, severe infestations were confined to the eastern part of the Province. Willow stands in the Hudson Bay District were moderately skeletonized, with the exception of a severe infestation in the area bounded by Hudson Bay, Veillardville, and Chemong. Occasional clumps of willow in this District were completely skeletonized.

Infestations in western Saskatchewan were very light. The only exception was a moderate infestation near Bolney and St. Cyr.

	Collections	Reports
Manitoba	192	48
Saskatchewan	156	36

A Pine Scale, *Toumeyella* sp.—Activity by this scale increased in Manitoba and Saskatchewan. The insect was more widely distributed with several light infestations being present in the Sandilands Forest Reserve. The only severe infestation in the Reserve was observed in tp. 5, rges. 9, and 10, E. P. mer., and in sec. 2, tp. 8, rge. 11, and sec. 26, tp. 6, rge. 10, E. P. mer. Scale populations in the Belair area showed a slight increase but damage remained light. Populations were very low at Julius, Milner Ridge, and Lac du Bonnet in southeastern Manitoba. Cowan was the only point in western Manitoba from which a collection was received. Very light infestations were observed in Saskatchewan in the Holbein, Steep Creek, and Home blocks of the Nisbet Provincial Forest.

	Collections	Reports
Manitoba	52	9
Saskatchewan	5	2

Pitch Nodule Maker, *Petrova albicapitana* (Busck).—The pitch nodule maker continued to attack jack-pine regeneration in Manitoba and Saskatchewan. Damage was more apparent from Westray north to Wanless in the Northern District of Manitoba than elsewhere in the two provinces. The most heavily infested areas were between Lake Atikameg and Reader Lake, and Freshford where about 80 per cent of the jack pine examined showed the presence of the pitch nodule maker.

The only appreciable damage in Saskatchewan was a moderate infestation at Denair Beach in Amisk Lake Provincial Forest.

In 1951 the most northerly collection of this insect was made at Gillam, Manitoba.

	Collections	Reports
Manitoba	107	38
Saskatchewan	99	16

American Poplar Beetle, *Phytodecta americana* Schffr.—As in previous years the American poplar beetle was most prevalent on open-growing young poplar. The infestations throughout Manitoba and Saskatchewan were usually very light. The only severe damage was observed in Saskatchewan at the Steep Creek Block of the Nisbet Provincial Forest (sec. 26, tp. 49, rge. 23, W. 2nd mer.) on scattered individual trees.

In Manitoba, light to moderate defoliation was noted in the Spruce Woods Forest Reserve. A small infestation of light intensity was reported south of Lac du Bonnet.

	Collections	Reports
Manitoba	56	24
Saskatchewan	135	25

Balsam-fir Sawfly, *Neodiprion abietis* (Harr.).—This insect was widely distributed again in Manitoba and Saskatchewan, but populations continued to decline in 1951. H. Clee, Manitoba Forest Service, reported complete defoliation of a few white spruce near Ashern.

	Collections	Reports
Manitoba	19	13
Saskatchewan	14	6

Yellow-headed Spruce Sawfly, *Pikonema alaskensis* (Roh.).—No apparent change in distribution or populations of this insect was observed in 1951. Damage was mainly restricted to either open-growing spruce or spruce shelter belts.

	Collections	Reports
Manitoba	120	14
Saskatchewan	115	7

A Webworm on Jack Pine, *Tetralopha* sp.—Populations of this insect increased in southeastern Manitoba. Jack pine around Stead was noticeably defoliated by this webworm.

	Collections	Reports
Manitoba	6	9
Saskatchewan	1	3

Red-pine Sawfly, *Neodiprion nanulus* Schedl.—Although populations of this insect decreased in 1951 it appeared to be more widespread. Several collections were received from Saskatchewan this year, where it was unreported in 1950.

	Collections	Reports
Manitoba	3	4
Saskatchewan	11	4

Green-headed Spruce Sawfly, *Pikonema dimmockii* (Cress.).—This species was slightly more abundant in 1951 than it was in 1950 but caused no appreciable defoliation. It was found generally in association with the yellow-headed spruce sawfly.

	Collections	Reports
Manitoba	123	7
Saskatchewan	55	3

Birch Tube-maker, *Acrobasis betulella* (Hlst.).—The birch tube-maker was most abundant in eastern and southern Manitoba. A slight increase in populations in this area was observed in 1951. A single collection was received from The Pas in northern Manitoba. The insect was collected in Saskatchewan at Big River, Meadow Lake, and Tweedsmuir.

	Collections	Reports
Manitoba	20	9
Saskatchewan	5	3

Birch Sawfly, *Arge pectoralis* (Leach).—This sawfly was widely distributed in Manitoba and Saskatchewan but in no instances was birch severely defoliated.

	Collections	Reports
Manitoba	3	6
Saskatchewan	5	3

Black-headed Budworm, *Acleris variana* (Fern.).—There was a general increase in the distribution and abundance of the black-headed budworm in Manitoba and Saskatchewan in 1951. Unreported in western Manitoba in 1950, it was common throughout this district in 1951.

	Collections	Reports
Manitoba	46	13
Saskatchewan	25	7

Spotless Fall Webworm, *Hyphantria textor* Harr.—Limited numbers of this insect were collected throughout central and southern Manitoba, but no collections were obtained from northern Manitoba or Saskatchewan in 1951. Although most prevalent in the southern part of Manitoba it did not cause any serious defoliation.

	Collections	Reports
Manitoba	12	9
Saskatchewan	0	2

Ugly-nest Caterpillar, *Archips cerasivorana* (Fitch).—Nests of this caterpillar were prevalent again in Manitoba and Saskatchewan. The heaviest concentrations occurred in the Spruce Woods Forest Reserve and at The Pas in Manitoba, and at Hudson Bay and Prince Albert in Saskatchewan.

	Collections	Reports
Manitoba	121	25
Saskatchewan	44	30

A Tent Caterpillar, *Malacosoma lutescens* (N. & D.).—This insect was widely distributed in Manitoba and Saskatchewan in 1951. The only appreciable damage was severe defoliation of choke cherry in the Home Block of the Nisbet Provincial Forest in Saskatchewan.

	Collections	Reports
Manitoba	15	10
Saskatchewan	27	14

Striped Alder Sawfly, *Hemichroa crocea* (Fourc.).—Severe infestations of this insect occurred in Manitoba at Riding Mountain National Park, south of Ashville, and at Durban. Alder in these areas were almost completely stripped of foliage. Light defoliation was observed at Madge Lake and Big River in Saskatchewan.

	Collections	Reports
Manitoba	7	10
Saskatchewan	2	4

White-pine Weevil, *Pissodes strobi* (Peck).—White-spruce and jack-pine regeneration in Manitoba and Saskatchewan were attacked again by the white-pine weevil. The most conspicuous damage occurred on open-growing trees in the Riding Mountain National Park in Manitoba, and Prince Albert National Park in Saskatchewan.

	Collections	Reports
Manitoba	47	12
Saskatchewan	17	8

Aspen Blotch Miner, *Lithocolletis tremuloidiella* (Braun).—This insect was quite prevalent and widespread in 1951. It caused conspicuous discoloration of foliage in most poplar stands in Manitoba and Saskatchewan.

	Collections	Reports
Manitoba	84	28
Saskatchewan	28	15

LIST OF CO-OPERATORS

Saskatchewan Department Natural Resources

Name	Collections	Name	Collections
Arnold, F. J	1	Kraatz, W	1
Arnold, R. F	1	La Bossiere, N	2
Arsenault, T. J	7	MacDonald, W. A	1
Bacon, J. M	9	MacNeill, W	167
Barton, H	3	McGimms, M	1
Beaudoin, F	5	McNeil, O. B	1
Beck, G	4	Michaud, H. P	25
Bell, C. T	5	Olson, C	7
Bryson, L. F	1	Over, E. C	8
Cockwill, J. G	11	Pederson, G. J	2
Cowie, J. J	2	Pegg, D. W	9
Crothers, W	14	Pond, H. G	5
Frechette, D	6	Reznechenko, L	5
Fremont, A	3	Rook, R	1
Goulden, L	3	Shannon, B. C	10
Harper, W. E	7	Sharman, E. A	53
Hawkins, F. J	3	Stark, A. G	2
Heron, J	7	Stubbington, S. W	2
Honig, V. P	3	Towill, A. C	13
Johnson, B. H	3	Wagner, W	4
Johnson, O. A	2		

Manitoba Forest Service

Name	Collections	Name	Collections
Bates, G. H	1	Machuk, A	1
Clee, H	3	Majure, M. T	15
Cooper, D. E	8	Mawdsley, W. F	2
Danyluk, W	14	McKeller, R	13
Davies, G. H	9	McKelvie, F	5
Denby, B	7	McKinnon, M. W	1
Dowson, C	2	Meseman, W. T	7
Emberley, G. C	20	Mooers, L. W	14
Emes, B. C	1	Nespor, J. E	6
Erlendson, E. W	1	Norman, J. B	5
Evans, G	25	Patterson, C. H	10
Fenner, F	14	Porath, L	4
Fenner, T	9	Ross, R	1
Gauthier, A. P	5	Russell, J	13
Gill, H. N	10	Ruth, W. W	20
Gow, R. D	13	Schortinghuis, S. W	1
Harrison, J. E	2	Shannon, W. A	2
Hislop, W. L	38	Smith, C. K	6
Hood, E	29	Thompson, J. W	4
Inkster, J. H	1	Tucker, W	17
Koke, J	17	Wardrop, W. D	11
Linn, C. E	5	Webster, W. K	7
Lintott, C. G	1	Wright, J. J	10

Private Co-Operators

Name	Collections	Name	Collections
Baldwin, S	1	McKay, D	1
Baudru, E	36	McRae, J. C	4
Bentley, N. W	2	Murphy, J. J	1
Cherrett, Mrs. M	1	Prouse, J	1
Foster, E. K	1	Sharman, P	1
Krivda, W	10	Slusas, Mrs. V	4
Lejeune, R. O	3	Swartz, Mrs. M	1
Madson, O	1	Turner, L	1
Major, Rev. Father	1	Warkentine, A	1
McAndrews, Mrs. W. J	1	White, S	2
McDowall, Miss L	1	Yelland, Mr	1
McInnes, N. J	2		

LIST OF CO-OPERATORS—Continued

Manitoba Paper Company

Name	Collections	Name	Collections
Campbell, B. H.	1	Halpin, G. R.	1
Farmer, R. G.	5	Naysmith, D.	1
Fortier, T.	1	Tarnow, E.	3

Riding Mountain National Park

Name	Collections	Name	Collections
Binkley, D. B.	2	Hyska, J.	16
Goodison, J. C.	4	McKinnon, R. D.	1

Prince Albert National Park

Name	Collections	Name	Collections
Jervis, F.	2	Marjerrison, G.	4

Dominion Laboratory Forest Pathology, Saskatoon

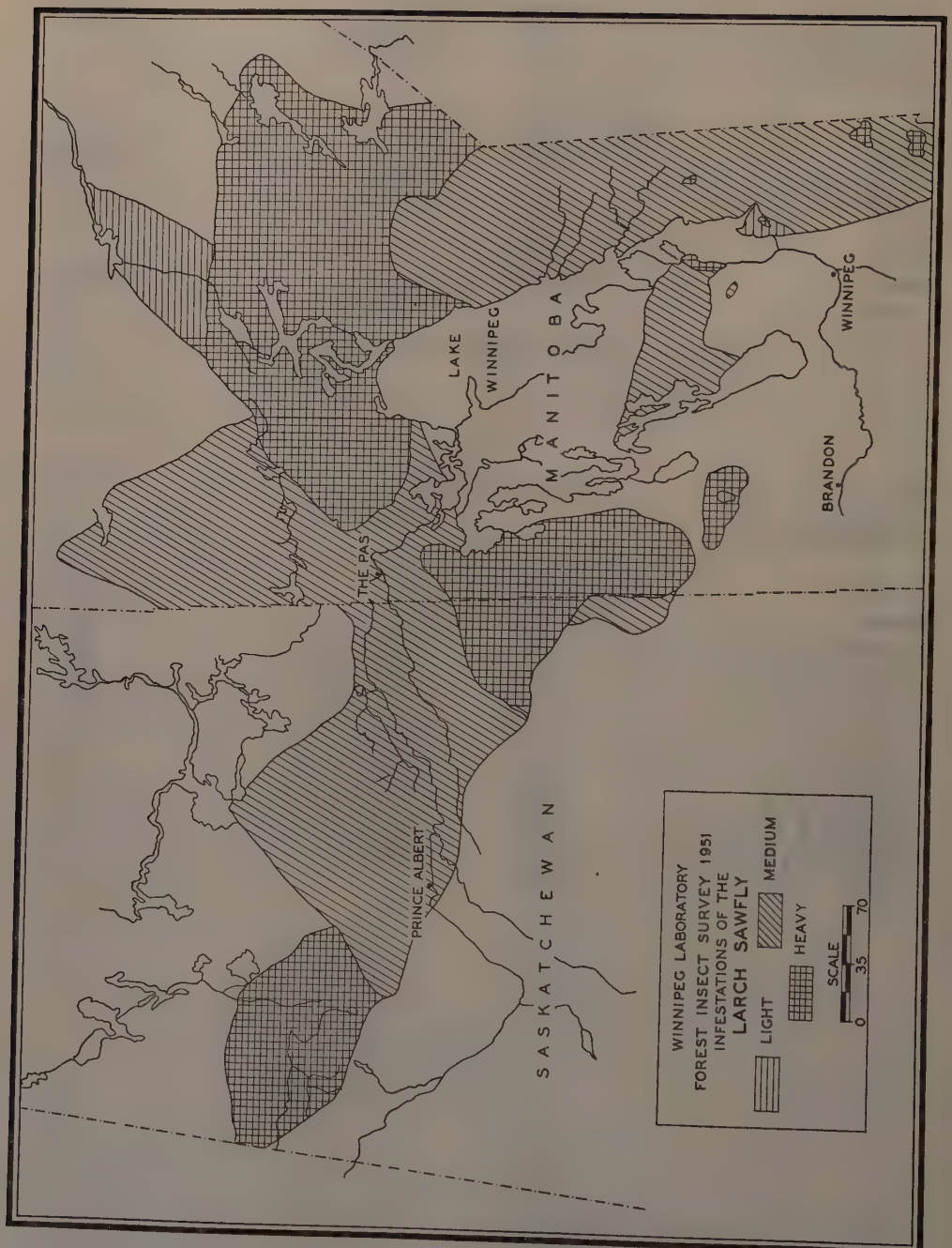
Name	Collections
Anastasiou, C.	2

Others

Name	Collections	Name	Collections
Heard, J.	1	Uhlman, J. C.	2
Robertson, D. R.	1		

Winnipeg Laboratory

Name	Collections	Name	Collections
Campbell, A. E.	36	McDowall, L. L.	705
Des Rosiers, R. A.	19	McKinnon, H. A.	56
Drouin, J. A.	619	McLeod, B. B.	801
Groves, D. H.	1	Melvin, J. C.	62
Heron, R. J.	5	Muldrew, J. A.	10
Hildahl, V.	116	Pratt, M. R.	643
Ives, W. G.	1	Prentice, R. M.	70
Lalor, G. T.	743	Smith, J. D.	4
Lawrence, J. J.	809	Steel, Miss R. E.	1
Lejeune, R. R.	14	Turnock, W. J.	27
Luetchford, Mrs. C. O.	17	Warren, G. L.	20
Machacek, Miss E. A.	29	Wong, H. R.	26
Martin, J. B.	702		


WINNIPEG LABORATORY
FOREST INSECT SURVEY 1951
INFESTATIONS OF THE
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LIGHT
MEDIUM
HEAVY
SCALE
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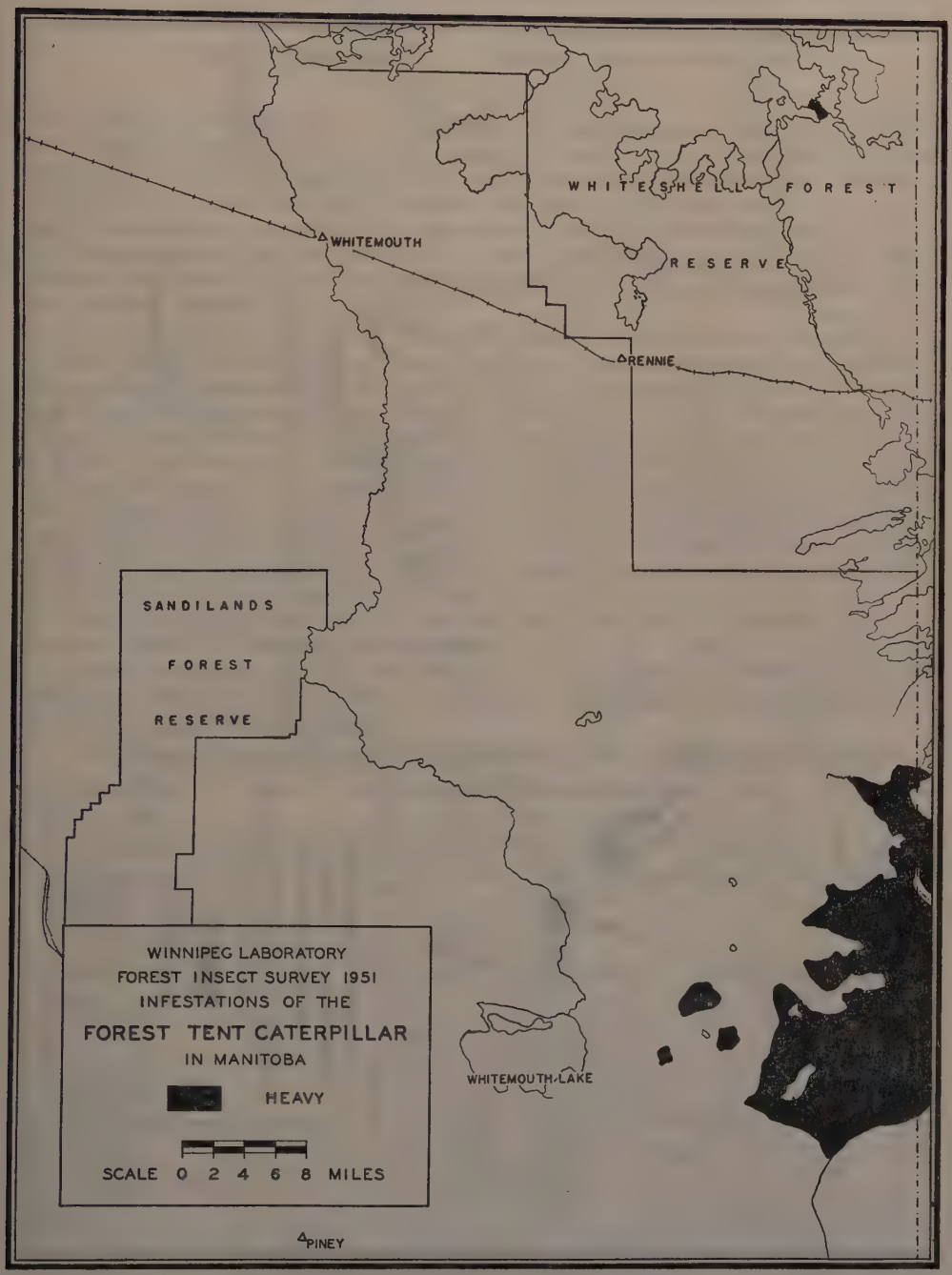
SASKATCHEWAN
PRINCE ALBERT
THE PAS
LAKE
WINNIPEG
MANITOBA
BRANDON
WINNIPEG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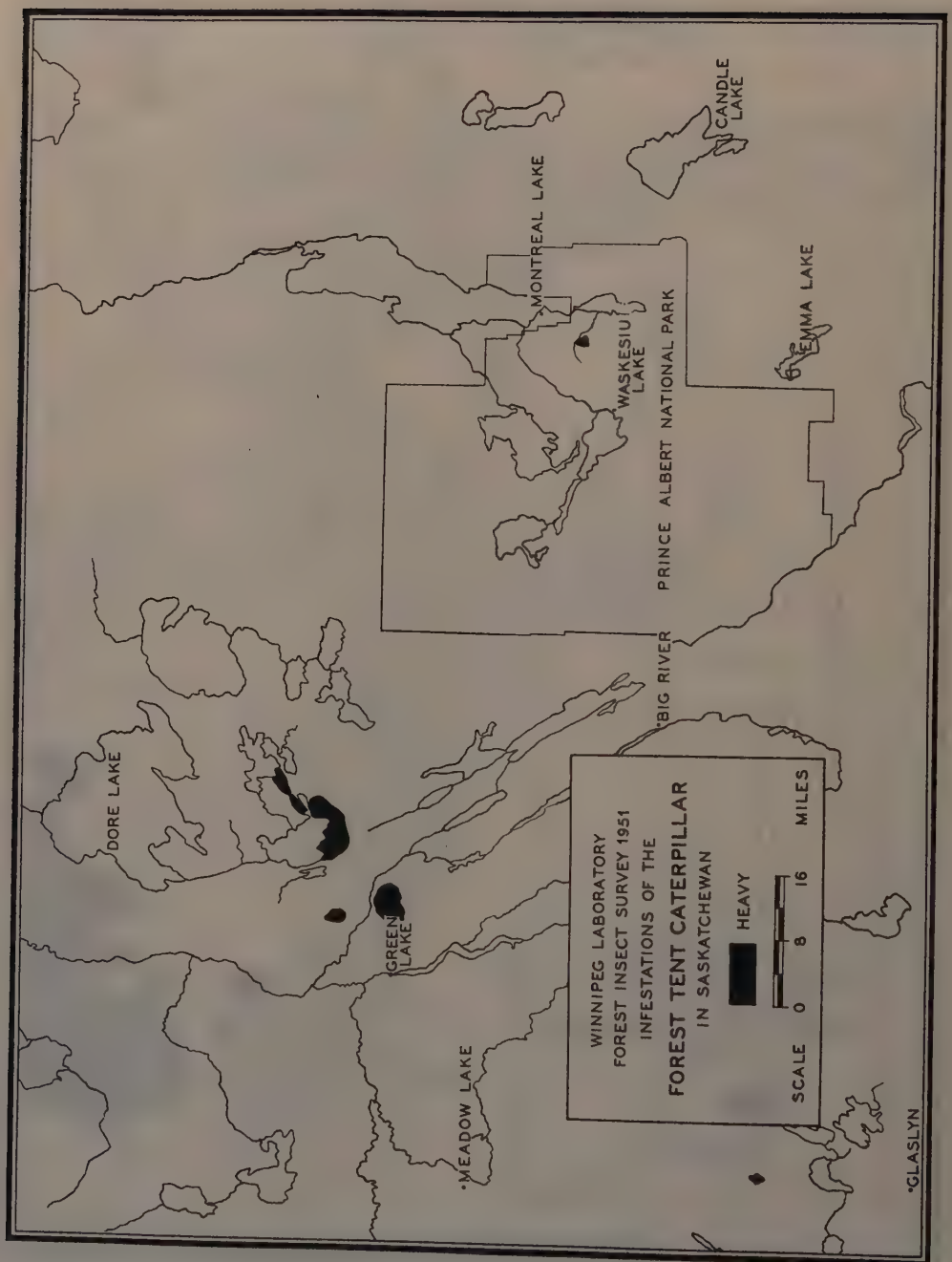
RESERVE
WHITEMOUTH
RENNIE
SANDILANDS
FOREST
RESERVE
WINNIPEG LABORATORY
FOREST INSECT SURVEY 1951
INFESTATIONS OF THE
FOREST TENT CATERPILLAR
IN MANITOBA
HEAVY
SCALE 0 2 4 6 8 MILES
WHITEMOUTH LAKE
PINEY


WINNIPEG LABORATORY
FOREST INSECT SURVEY 1951
INFESTATIONS OF THE
FOREST TENT CATERPILLAR
IN SASKATCHEWAN
HEAVY
SCALE 0 8 16 MILES
DORE LAKE
GREEN LAKE
MEADOW LAKE
GLASLYN
BIG RIVER
PRINCE ALBERT NATIONAL PARK
MONTREAL LAKE
WASKESIU LAKE
EMMA LAKE
CANDLE LAKE

PRAIRIE PROVINCES

AGRICULTURAL AREA

C. E. Brown and Margaret E. P. Cumming

Dominion Entomological Laboratory, Indian Head, Sask.

INTRODUCTION

Insects were less injurious to trees in the agricultural region of the Prairie Provinces in 1951 than for the past several years. Species causing the most injury were the yellow-headed spruce sawfly, the fall cankerworm, and the large aspen tortrix. Populations of the balsam-fir sawfly, the grey willow leaf beetle, and the cecropia caterpillar have decreased during the last few years.

Fewer collections were received in 1951 (2418) than in 1950 (3214). This decrease was due to a reduction in the field staff and to a large number of days lost because of rain.

In early spring the Forest Biology Rangers were engaged in a survey of southern Alberta to determine those areas in which a general survey would be unnecessary. There were few shelterbelts in the area south of No. 1 highway from the Saskatchewan border west to Taber, Alta. In the irrigated areas at Taber and Lethbridge, Alta., shelterbelts were found on almost every quarter section. The trees most commonly used in these shelterbelts were hybrid poplars.

A special survey to determine the number of shelterbelts infested with the yellow-headed spruce sawfly in the Melfort Agricultural District of Saskatchewan was started in September but had to be discontinued because of road conditions. Later a similar survey was conducted in the agricultural districts of Minnedosa and Neepawa in Manitoba.

Larvae collected dead in the field were examined for the presence of disease. Several important diseases were found.

Close co-operation with the Dominion Laboratory of Forest Pathology, Saskatoon, Sask., resulted in the satisfactory identification of a large number of samples from diseased trees.

The number of collections from each species of tree or shrub was as follows:—

Coniferous Host	Collections	Coniferous Host	Collections
Cedar	3	Black spruce	7
Balsam fir	1	Colorado spruce	85
Larch (species not given)	25	White spruce	1,048
Jack pine	11	Spruce (species not given)	64
Lodgepole pine	11	Tamarack	14
Scots pine	3		
Pine (species not given)	1	Total	1,273

Deciduous Host	Collections	Deciduous Host	Collections
Apple	15	Plum	11
Green ash	79	Aspen poplar	72
Boxelder	506	Balsam poplar	12
Birch	8	Cottonwood	6
Caragana	118	Northwest poplar	15
Chokecherry	13	Russian poplar	18
Currant	32	Poplar (species not given)	23
Dogwood	2	Raspberry	3
White elm	127	Rose	10
Gooseberry	6	Saskatoon	13
Hawthorn	3	Willow	102
Hazel	5		
Bur oak	76	Total	1,275

Miscellaneous and unknown hosts 141

Grand Total 2,689*

* Some collections were made from more than one species of host.

IMPORTANT INSECTS

Yellow-headed Spruce Sawfly, *Pikonema alaskensis* (Roh.).—The distribution of the yellow-headed spruce sawfly in 1951 remained much the same as in 1950. Infestations were present on planted spruce throughout the aspen grove region of the Prairie Provinces.

Severe injury was reported from the northeastern agricultural region of Saskatchewan. Some severe infestations were reported from other areas but most were medium or light.

A special survey in the Neepawa-Minnedosa, Man., area showed that 13·6 per cent of the 228 belts surveyed were infested with the yellow-headed spruce sawfly.

Collections and Reports

Manitoba	81
Saskatchewan	165
Alberta	50

Balsam-fir Sawfly, *Neodiprion abietis* (Harr.).—In 1950 a virus disease reduced infestations of the balsam-fir sawfly at Archerwill in northeastern Saskatchewan. This disease was again present in 1951. Few larvae were received from the northeastern agricultural area of Saskatchewan. Reduction of the balsam-fir sawfly populations in that area was probably caused by the virus disease. Populations of this sawfly in Alberta were small in 1951; one collection containing virus disease was received from Lacombe, Alta. In Manitoba infestations were similar in number and intensity to those in 1950. The most serious infestations were in the Brandon-Neepawa-Birtle area. No diseased larvae were received from Manitoba.

Collections and Reports

Manitoba	42
Saskatchewan	10
Alberta	12

Fall Cankerworm, *Alsophila pometaria* (Harr.).—The fall cankerworm was the most injurious pest of deciduous trees in the agricultural area of the Prairie Provinces in 1951.

The largest number of severely infested shelterbelts was in south-central Saskatchewan, north of Regina and Moose Jaw.

The number and intensity of cankerworm infestations in the Assiniboia-Weyburn-Radville, Sask. area decreased in 1951; this decrease was probably due to the increased artificial control. Reports of light damage were received from southwestern Saskatchewan. Local infestations were reported from Drumheller, Alta., Dauphin, and the Stony Mountain-Winnipeg area of Manitoba. Damage in the Stony Mountain-Winnipeg area was difficult to assess as *Archips negundana* Dyar was also present.

Collections and Reports

Manitoba	32
Saskatchewan	142
Alberta	15

Citheroniids on Oak, *Anisota virginiensis* Dru.; *Anisota* sp.—In 1950 *Anisota virginiensis* severely defoliated oak in the Thornhill, Man. area. Defoliation was severe again in 1951. The infested area extended along the Manitoba escarpment from Thornhill to Miami. Pockets of complete defoliation were found within the area, while other stands were free from larvae. Pupae were found in large numbers in the fall.

Severe local infestations occurred at Morris and Otterburne, Man. Pupae were not numerous at these locations in the fall.

An unidentified species of *Anisota*-infested oak in the Pembina Valley south of Darlingford, Man. This infestation extended along the valley for 10 miles from the international border. Defoliation was less severe than in the Thornhill area. Although the infestations by these two species were close geographically each appeared to have developed independently. Seasonal development of the *Anisota* sp. in the Pembina Valley was 2 weeks later than that of *A. virginiensis* at Thornhill.

Larvae killed by fungus diseases were common in many of the defoliated areas. Diseases found were: *Beauveria globulifera* (Speg.), *Fusarium* sp. and *Empusa* sp. from Thornhill, *Fusarium* sp. from Morris and *B. globulifera* from the Pembina Valley near Darlingford, Man. These diseases may have been responsible for the scarcity of pupae in some areas.

Collections and Reports

Manitoba	75

Large Aspen Tortrix, *Archips conflictana* (Wlkr.).—The area infested by the large aspen tortrix at Glaslyn, Sask., increased in 1951. An aerial survey made by personnel of the Forest Insect Laboratory, Winnipeg, Man., indicated that the boundary of the infestation ran from the northeast corner of tp. 54, rge. 17, W. 3rd mer., (24 miles north of Glaslyn) southeast to a point 5 miles east of Juror, southwest to the northern edge of Jackfish Lake, northwest to a point approximately 6 miles west of Brightsand Lake, then northeast to the starting point. Medium to severe defoliation occurred throughout most of the northwest, west, and southern parts of the area.

The large aspen tortrix outbreak in Alberta extended from 3 miles south of Sylvan Lake to Bowden and was approximately 4 miles wide. Severe defoliation occurred 4 miles south of Sylvan Lake. Thirty-five per cent of the larvae and pupae received from this area were parasitized.

Collections and Reports

Saskatchewan	3
Alberta	16

Grey Willow Leaf Beetle, *Galerucella decora* (Say).—The outbreak of the grey willow leaf beetle began to build up in 1945, reached a peak in 1948, and then declined. Fewer collections were received in 1951 than in any year since 1945. Heaviest infestations were found in the interlake area of Manitoba. A few adults were observed on aspen at Dauphin, Minnedosa, and Lac du Bonnet, Man. Adults caused light defoliation at Red Deer, Lacombe, and Spruce Grove, Alta.

Collections and Reports

Manitoba	10
Alberta	5

Spruce Spider Mite, *Paratetranychus ununguis* (Jac.).—Damage to shade and shelterbelt trees by the spruce spider mite was less severe than in 1950. It was common in Saskatchewan and Alberta but was found in few locations in Manitoba. Severe infestations occurred in the town of Indian Head, Sask.

Cold weather and heavy rains retarded development.

Collections and Reports

Manitoba	12
Saskatchewan	24
Alberta	42

Pine Needle Scale, *Phenacaspis pinifoliae* (Fitch).—Light to medium infestations on spruce and pine were common in the agricultural region of the Prairie Provinces. Heavy infestations occurred at Middlechurch and Hamiota, Man.

A special study at Indian Head, Sask., showed a low mortality during the summer of 1951. Larger populations are expected in 1952.

	Collections and Reports
Manitoba	49
Saskatchewan	16
Alberta	6

Conifer Gall Aphids, *Adelges* spp.; *Pineus* spp.—Gall aphids on conifers occurred throughout the region but were not of economic importance. Galls were found on spruce; cottony masses and winged adults on spruce, pine and larch.

	Collections and Reports
Manitoba	114
Saskatchewan	75
Alberta	32

Spruce Budworm, *Choristoneura fumiferana* (Clem.).—A few collections of this insect were received from widely separated locations. Each collection contained only one or two insects and defoliation was negligible.

	Collections and Reports
Manitoba	1
Saskatchewan	2
Alberta	4

Conifer Seedworm, *Laspeyresia youngana* (Kearft.).—Few collections of this insect were received. It was severe only at Garrick, Sask.

	Collections and Reports
Manitoba	22
Saskatchewan	7

Aphids on Conifers, *Cinara* spp.—These aphids were found throughout the region. The species most frequently reported were *Cinara hottesi* (Gillette & Palmer) and *Cinara fornacula* Hottes on spruce, and *Cinara laricis* (Hartig) on larch.

	Collections and Reports
Manitoba	13
Saskatchewan	39
Alberta	44

Larch Sawfly, *Pristiphora erichsonii* (Htg.).—The larch sawfly was present in most of the native larch stands visited in Manitoba and Saskatchewan. In Manitoba, heavy infestations were reported from Benito and the Interlake Area. In Saskatchewan, medium to heavy defoliation occurred throughout much of the northeastern agricultural area; complete defoliation was reported from White Fox, Shellbrook, and Bjorkdale. In Alberta, light infestations of larch sawfly were found on shelterbelts at Consort and Wetaskiwin; there were no infestations in the native stands visited.

	Collections and Reports
Manitoba	9
Saskatchewan	22
Alberta	3

Cecropia Moth, *Hyalophora cecropia* (L.).—Populations of this insect are at a low level; no larvae were received in 1951. Five collections were submitted, three of old cocoons and two of single adult moths.

	Collections and Reports
Saskatchewan	5

Boxelder Twig Borer, *Proteoteras willingana* (Kearf.).—This insect was present in many shelterbelts but did little damage.

	Collections and Reports
Manitoba	12
Saskatchewan	34
Alberta	8

Boxelder Aphid, *Periphyllus negundinis* (Thos.).—Early in the 1951 season large populations of aphids were reported from the southern parts of Manitoba and Saskatchewan. These populations declined during the summer; no large populations were found in the fall. Coccinellids were present in large numbers and helped to reduce infestations.

A survey conducted at Lyleton, Man., and reports from other areas indicated that the heavier infestations occurred on mature trees.

	Collections and Reports
Manitoba	98
Saskatchewan	33
Alberta	12

Boxelder Psyllid, *Psylla negundinis* (Mally).—This insect did not cause serious injury to boxelder in 1951.

	Collections and Reports
Manitoba	13
Saskatchewan	30
Alberta	2

Ash Borer, *Podosesia syringae fraxini* (Lug.).—Fewer collections were received in 1951 than in 1950. A heavy infestation was found in green ash at a neglected school planting near Valor, Sask.; light infestations were found in farm shelterbelts near Radville, Sask., and Minnedosa, Man.

Roadside plantings at the Provincial Gaol Farm, Regina, Sask., were also infested.

	Collections and Reports
Manitoba	1
Saskatchewan	2

PoplarBorer, *Saperda calcarata* Say.—A stand of aspen poplar at Killarney, Man., was heavily infested. Light to medium infestations occurred in other areas.

	Collections and Reports
Manitoba	2

Black-headed Ash Sawfly, *Tethida cordigera* (Beauv.).—The black-headed ash sawfly was less abundant in 1951 than in 1950. Collections were received from Manitoba and Saskatchewan. Larvae were numerous at Simpson, Sask. Other infestations were light.

	Collections and Reports
Manitoba	2
Saskatchewan	10

Caragana Seed Chalcid, *Bruchophagus* sp.—The caragana seed chalcid was common in caragana plantings in Manitoba, Saskatchewan, and Alberta. Seeds of *Caragana arborescens, C. frutescens, C. pygmaea* and *C. sophoraepholia* were infested.

	Collections and Reports
Manitoba	6
Saskatchewan	8
Alberta	21

Caragana Aphid, *Macrosiphum carraganae* (Cholod.).—In Saskatchewan, severe infestations occurred at the Forest Nursery Station, Indian Head, and in the agricultural districts of Shellbrook, Tisdale, Nipawin, and Melfort. In Manitoba, heavy infestations were found at Lac du Bonnet and Dufrost. Light infestations were reported from Alberta.

	Collections and Reports
Manitoba	23
Saskatchewan	18
Alberta	16

Blister Beetles, *Lytta* spp; *Epicauta* spp.—Blister beetles did not cause serious defoliation of trees in 1951.

	Collections and Reports
Manitoba	1
Saskatchewan	4
Alberta	1

Aphids on Elm, *Eriosoma americanum* (Riley); *Eriosoma lanigerum* (Hausm.); *Myzocallis ulmifolii* (Monell).—The woolly elm aphid, *E. americanum,* was common throughout the area; injury was light. The woolly apple aphid, *E. lanigerum,* was less common than the woolly elm aphid but widely distributed. The elm leaf aphid, *M. ulmifolii,* which was abundant in 1950, was not injurious in 1951.

	Collections and Reports
Manitoba	45
Saskatchewan	21
Alberta	35

Tent Caterpillars, *Malacosoma lutescens* (N. & D.) *Malacosoma disstria* Hbn.; *Malacosoma americanum* (F.).—Colonies of *M. lutescens* were common along roadsides throughout most of Saskatchewan. Few collections were received from Manitoba. *M. disstria* was reported from several places in western Alberta. One collection of *M. americanum* was received from Gordon, Man.

	Collections and Reports
Manitoba	2
Saskatchewan	34
Alberta	18

Spotless Fall Webworm, *Hyphantria textor* Harr.—A few collections of the spotless fall webworm were received in 1950. Injury was light.

	Collections and Reports
Manitoba	7

LIST OF CO-OPERATORS

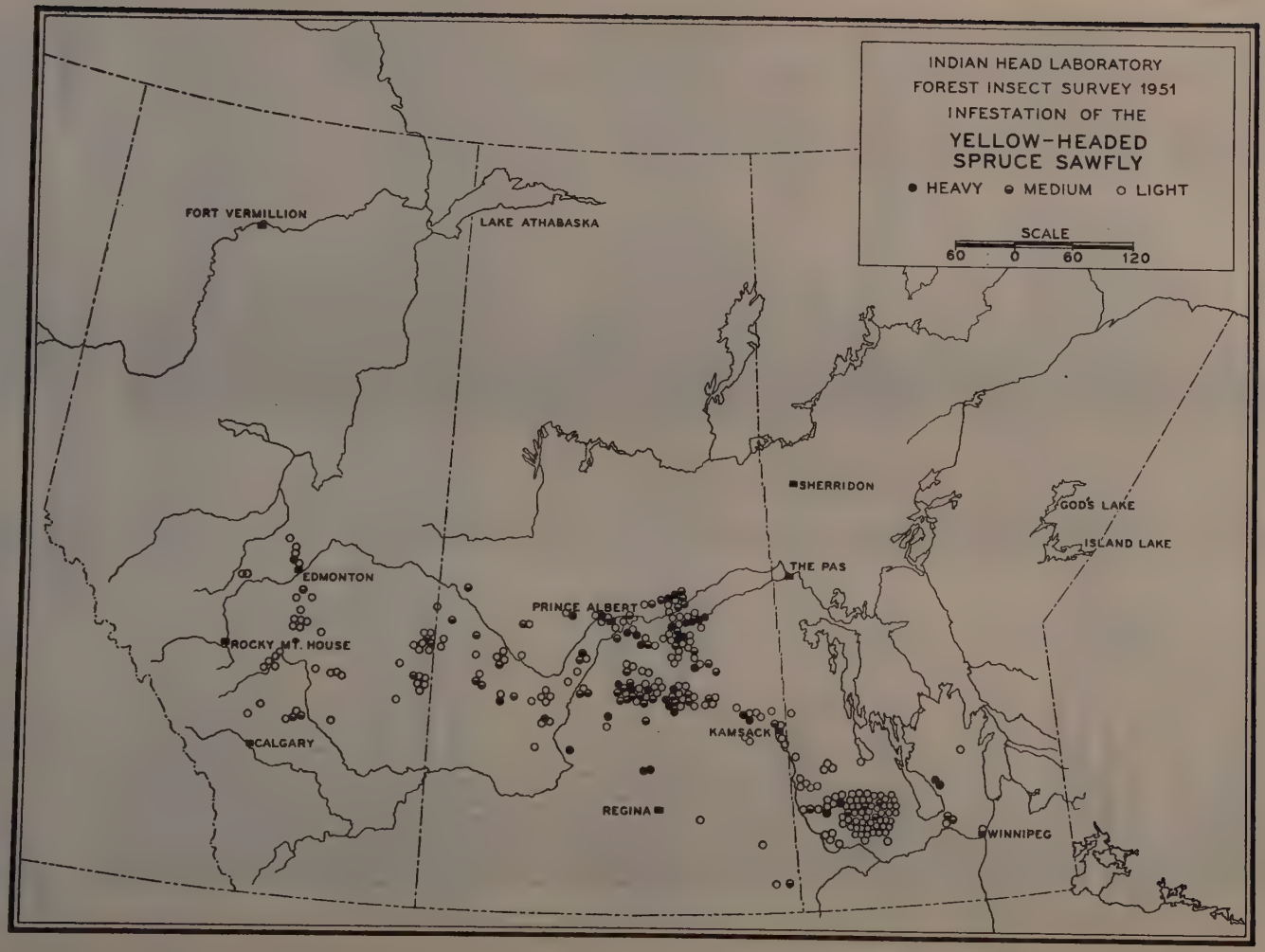
Name	Collections	Name	Collections
Alcock, Mrs. F.	1	Atchison, O. N.	2
Anderson, J. L.	2	Backman, W. S.	2
Appleton, D.	1	Baenes, F.	1
Archdekin, J. T.	1	Bailey, C. T. G.	1
Archer, A.	10	Baker, A. J.	1

LIST OF CO-OPERATORS—Continued

Name	Collections	Name	Collections
Bard, F. G.	2	Kunkel, J. W.	1
Bates, C. E. G.	1	Lafrance, J. E.	1
Bean, Miss Ivy S.	1	Lawrence, B.	1
Beaven, A.	1	Linton, T.	1
Belcher, S. R.	2	Ludlam, M. W.	4
Bell, W.	1	Lutz, Mrs. J. F.	2
Biehn, F.	1	McCowan, Mrs. J. A.	1
Blue, J. A.	1	McKeller, A. H.	1
Bolingbroke, B.	1	McKelvie, F.	1
Boston, B. R.	1	McKinney, R. L.	1
Boucher, W. H.	2	McPhail, H.	2
Braidth, J.	1	Marquardt, Mrs. C.	1
Brazier, G.	1	Mars, Mrs. L.	1
Brinkworth, H. W.	3	Marsellus, V.	1
Brown, Mrs. H. W.	1	Mickelson, O.	1
Brownmiller, E.	1	Morrow, J. H.	5
Butt, J.	1	Muir, A. C.	7
Caskey, R. D.	6	Murray, W.	5
Casewell, C. C.	1	Ness, S.	1
Caswell, C. G.	1	Nichol, J. C.	1
Charlebois, A.	3	Nicholson, J. H.	1
Child, Mrs. A.	1	Osborne, G.	1
Cholin, Mrs. H.	2	Owen, E. R.	1
Christenson, Mrs. H.	1	Patterson, Mrs. V.	1
Cockle, Mrs. E. S.	1	Pich, J.	18
Cosgrove, C. A.	1	Price, R. D.	1
Cram, W. H.	8	Purvis, Mrs. R.	1
DeMott, S. S.	1	Rasmusson, L. W.	1
Dewar, Mrs. R.	1	Rayner, H. M.	1
Doty, G. H.	1	Robbins, R. P.	1
Drummond, T.	1	Robinson, D. R.	3
Duncham, C.	1	Rogers, R.	1
Dunlop, R. H.	2	Rovang, C. O.	1
Durrant, J. B.	1	Rowles, T.	1
Eastwood, I. M.	1	Samoisette, N.	1
Feyer, E.	1	Sanders, J.	1
Fletcher, D. L.	3	Scobie, D.	10
Forbes, J. C.	1	Scott, L.	1
Forbes, J. O.	3	Shaw, C.	9
Forbes, R. E.	1	Shellmerdine Nurseries	5
Foreman, J. R.	2	Sherrick, J. D.	2
Fosen, S. P.	1	Simmons, Mrs. A.	1
Freed, Mrs. V. A.	1	Smith, J. E.	1
Fuller, G.	3	Smith, W. S.	1
Gould, Mrs. G. S.	1	Stewart, Miss K. H.	1
Graf, M.	1	Stitt, S. J.	1
Harborenko, W.	2	Sutermeister, W.	2
Hargrave, P. D.	1	Tangjerd, H.	2
Heffort, F. M.	1	Thompson, H. W.	1
Hill, D. J.	1	Webster, A. J.	1
Holman, Mrs. W. H.	1	Weslock, A. F.	1
Horner, Miss J.	1	Whiteside, G. A.	1
Hyndman, Mrs. B.	1	Wild, C.	1
Hyndman, Mrs.	1	Williams, L. D.	2
Jackson, W. H.	3	Young, W. W.	1
Kalthoff, E.	1	Zak, Mrs. J.	2
Knowles, G.	1	Ziehl, Mrs. F.	1
Kosha, J. S.	1	Zilkie, E. J.	1

Indian Head Laboratory—1951

Name	Collections	Name	Collections
Bradley, G. A.	21	McMullin, D.	6
Brown, C. E.	27	Patterson, V. B.	711
Cumming, Miss M.	2	Peterson, L. O. T.	5
Forsman, R.	9	Petty, J.	778
Garraway, F. L.	7	Stanger, J. D.	2
Hedlin, A. F.	4	Wall, P. J.	594
Lindquist, O. H.	14	Widdup, R.	3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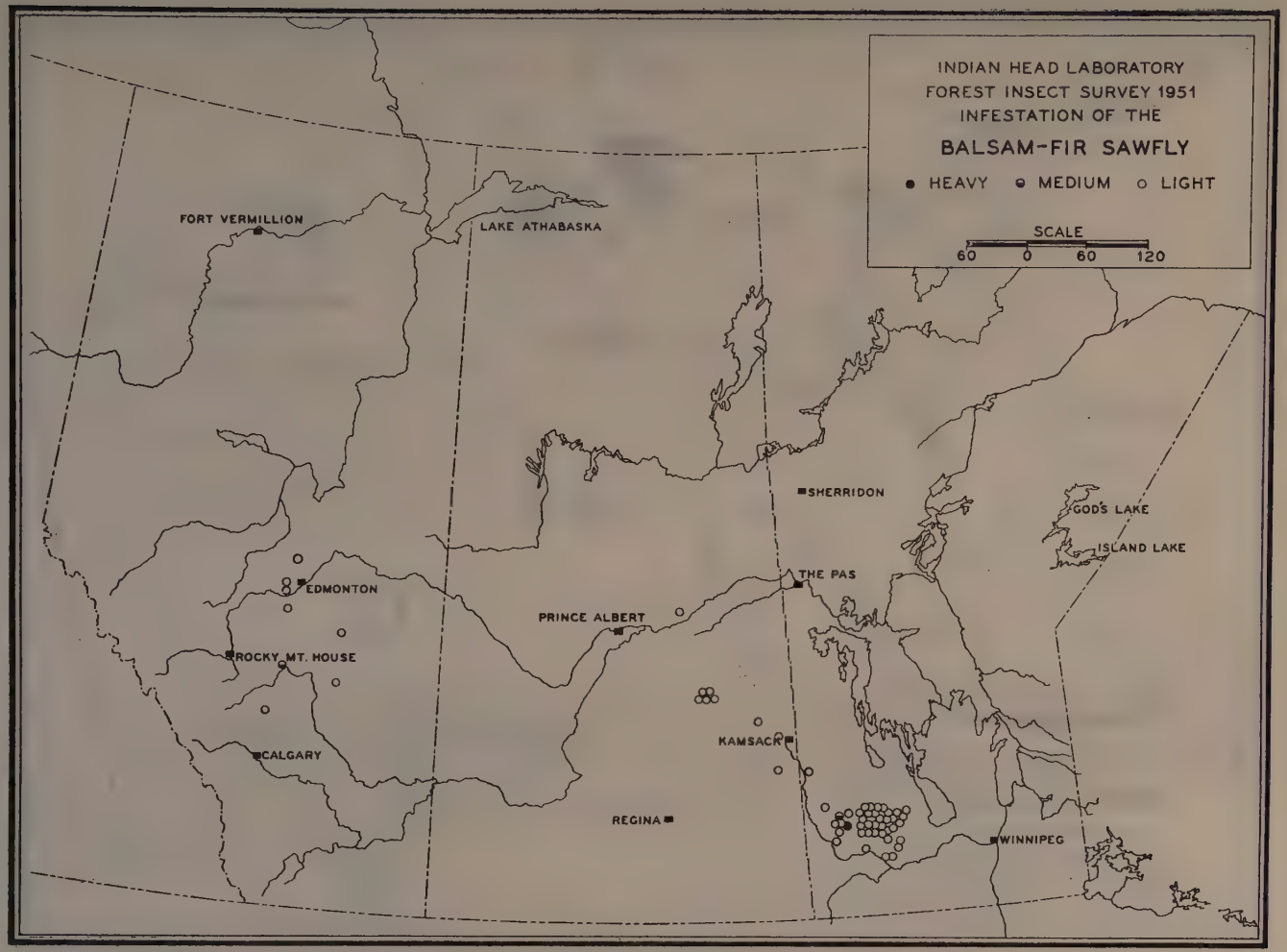
FOREST INSECT SURVEY 1951
INFESTATION OF THE
YELLOW-HEADED
SPRUCE SAWFLY
● HEAVY ⊙ MEDIUM ○ LIGHT
SCALE
60 0 60 120
FORT VERMILLION
LAKE ATHABASKA
SHERRIDON
GOD'S LAKE
ISLAND LAKE
THE PAS
EDMONTON
PRINCE ALBERT
ROCKY MT. HOUSE
KAMSACK
CALGARY
REGINA
WINNIPEG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FOREST INSECT SURVEY 1951
INFESTATION OF THE
BALSAM-FIR SAWFLY
HEAVY
MEDIUM
LIGHT
SCALE
60 0 60 120
FORT VERMILLION
LAKE ATHABASKA
SHERRIDON
GOD'S LAKE
ISLAND LAKE
THE PAS
EDMONTON
PRINCE ALBERT
ROCKY MT. HOUSE
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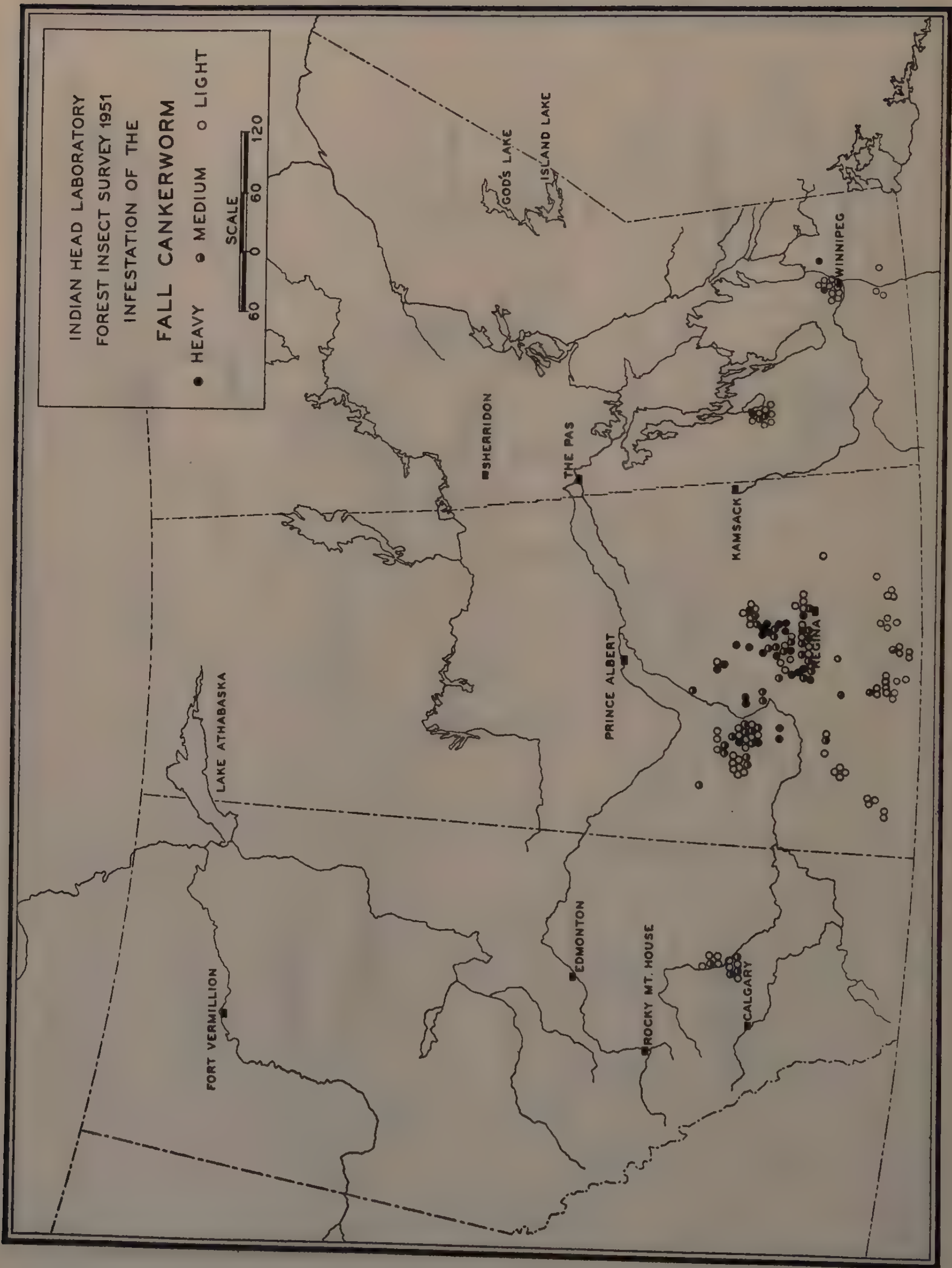
INDIAN HEAD LABORATORY
FOREST INSECT SURVEY 1951
INFESTATION OF THE
FALL CANKERWORM
HEAVY
MEDIUM
LIGHT
SCALE
60
0
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120
GOD'S LAKE
ISLAND LAKE
WINNIPEG
SHERRIDON
THE PAS
KAMSACK
REGINA
PRINCE ALBERT
LAKE ATHABASKA
EDMONTON
ROCKY MT. HOUSE
CALGARY
FORT VERMILLION


WINNIPEG
OTTERBURNE
MIAMI
MORRIS
MORRIS
DARLINGFORD
THORNHILL
MORDEN
INDIAN HEAD LABORATORY
FOREST INSECT SURVEY 1951
INFESTATION OF
ANISOTA SPP.
ANISOTA VIRGINIENSIS
ANISOTA SP.
HEAVY
MEDIUM
LIGHT

ALBERTA AND ROCKY MOUNTAIN NATIONAL PARKS

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INTRODUCTION

The Forest Insect Survey in the Rocky Mountain region increased appreciably in 1951 and greater emphasis was placed on sampling from conifers and poplars. Two field trips to the Northwest Territories were undertaken by officers of this laboratory in response to a request for assistance in forest insect survey work by Mr. William Sloan, Officer-in-Charge of Forest and Wildlife Management at Fort Smith. Forest insect conditions for this region are given in this report.

The number of collections in each area is presented in Table I. Table II gives the total number of collections from each tree species and from shrubs and herbaceous plants of the forest.

TABLE I.—NUMBER OF COLLECTIONS BY AREAS, 1948-1951

A. National Parks

Park	1948	1949	1950	1951
Banff	104	50	312	379
Jasper	68	178	300	273
Waterton Lakes	82	90	96	174
Yoho	61	56	126	91
Kootenay	31	19	110	182
Glacier	6	8	10	4
Mt. Revelstoke	4	8	8	10
Total	356	409	962	1,113

B. Alberta Forest Districts

Forest District	1948	1949	1950	1951
Crowsnest	44	310	339	226
Bow River	96	130	183	176
Clearwater	57	85	624	1,008
Brazeau-Athabasca	21	395	699	667
Northern Alberta	19	443	615	690
Cypress Hills	0	1	21	93
Total	237	1,364	2,481	2,860

TABLE II.—NUMBER OF COLLECTIONS BY TREE SPECIES

A. Coniferous Trees

Species	Collections	Species	Collections
White spruce	1,553	Alpine larch	1
Black spruce	31	Lodgepole pine	884
Engelmann spruce	77	Jack pine	23
Spruce (unspecified)	66	Limber pine	32
Balsam fir	28	Pine (unspecified)	14
Alpine fir	70	Western cedar	6
Douglas fir	209	Western hemlock	3
Eastern larch	225	Juniper	57
		Total	3,279

TABLE II—NUMBER OF COLLECTIONS BY TREE SPECIES—*Concluded*

B. Deciduous Trees

Species	Collections	Species	Collections
Trembling aspen	311	Willow	122
Cottonwood	85	Choke cherry	7
Poplar (unspecified)	6	Currant (unspecified)	6
Mountain maple	1	Gooseberry (unspecified)	10
White birch	31	Other shrubs	39
Birch (unspecified)	19	Herbs	7
Alder	50		
		Total	694
		Grand Total	3,973

IMPORTANT INSECTS

Lodgepole Needle Miner, *Recurvaria milleri* Busck.—This needle miner was present in all areas of the 1950 infestation but the population density was less than that of last year in most areas of Banff National Park. In Yoho National Park the population was slightly higher than in 1950 but about the same as in 1949.

In two areas of Jasper National Park the needle miner outbreak has increased considerably. At Poboktan Creek and on the Edith Cavell road there was a population of approximately 30 and 33 larvae respectively per branch tip; in the latter area the greatest population in 1950 was 9·4 miners per tip. A light infestation was found throughout the area of the 1950 infestation i.e., from the upper reaches of the Sunwapta River northward to beyond Jasper townsite along the Athabasca River.

	Collections	Reports
Banff National Park	0	2
Jasper National Park	0	1
Kootenay National Park	0	1
Yoho National Park	0	1
Elkwater Provincial Park	1	1

Spruce Budworm, *Choristoneura fumiferana* (Clem.).—Near Marble Canyon, in Kootenay National Park, the budworm infestation was from medium to light in intensity. In Yoho National Park the population was heavy in the Yoho River Valley and around Emerald Lake. The damage was light around Lake Louise and down the Bow River Valley in Banff National Park. In the Saskatchewan River Crossing area of this park, the population was heavy.

The spruce budworm was also found at Castlemount, Hillcrest, Coleman and the Porcupine Ranger Station in the Crowsnest Forest Reserve and at Grande Prairie, Peace River, and Smith in the northern Alberta forest district. In none of the samples were more than two specimens found.

In Wood Buffalo Park and the adjacent areas of the Northwest Territories and northeastern Alberta, this insect was found in populations ranging from endemic to outbreak.

	Collections	Reports
Banff National Park	4	2
Kootenay National Park	1	1
Yoho National Park	1	1
Crowsnest Forest District	7	
Northern Alberta Forest District	3	1
Northwest Territories		1

A Budworm, *Choristoneura* sp.—Incidence of this pine feeding insect in 1951 was negligible.

	Collections	Reports
Crowsnest Forest District	1	

Black-headed Budworm, *Acleris variana* (Fern.).—The distribution of this budworm was general throughout the forested regions of Alberta. In northeastern Alberta and the adjacent area of the Northwest Territories examined in the special surveys, light outbreaks of this insect occurred where there was a high spruce budworm population.

TABLE III.—BLACK-HEADED BUDWORM ABUNDANCE

National Parks

Year	Average number of specimens per sample			
	Banff	Kootenay	Yoho	Jasper
1950	.....	1·4	.....	3·0
1951	.....	6·4	.....	2·4

Forest Districts

Year	Crowsnest-Bow	Clearwater	Brazeau Athabasca	Northern Alberta
1950	1·5	2·0	2·7	2·0
1951	2·2	2·7	4·2	1·8

	Collections	Reports
Banff National Park	49	1
Yoho National Park	8	
Kootenay National Park	1	
Waterton Lakes National Park	1	
Jasper National Park	47	
Crowsnest Forest District	20	
Bow River Forest District	10	
Clearwater Forest District	59	
Brazeau-Athabasca Forest District	86	1
Northern Alberta Forest District	145	
Northwest Territories	1	

False Hemlock Looper, *Nepytia canosaria* (Wlk.).—No specimens of this insect were obtained in 1951.

Larch Sawfly, *Pristiphora erichsonii* (Htg.).—Little, if any change in the area or intensity of the infestation near Cold Lake was noted.

	Collections	Reports
Northern Alberta Forest District	15	1

Mountain pine Beetle, *Dendroctonus monticolae* Hopk.—No increase in the population of this beetle in Yoho and Kootenay National Parks was noted in 1951.

	Collections	Reports
Yoho National Park	3	1
Kootenay National Park	2	1

American Poplar Beetle, *Phytodecta americana* (Schffr.).—Small infestations of this insect on aspen were found in the Clearwater Forest District near Rocky Mountain House and Sundre. Aspen trees in the Highwood and Big Horn areas of the Bow River forest district were severely attacked; while most of the trees defoliated in 1950 were understory or small trees, those damaged in 1951 were large trees, Small groups of trees in the Willow Creek, Porcupine Hills and Livingstone regions of the Crowsnest forest district were defoliated to a greater or less extent. In Waterton Lakes National Park, aspen was completely defoliated in small patches at the Golf Course; along the Cameron Lake and Chief Mountain roads, there was some defoliation.

	Collections	Reports
Waterton Lakes National Park	3	1
Northern Alberta Forest District	2	
Brazeau-Athabasca Forest District	1	
Clearwater Forest District	10	1
Bow River Forest District	9	1
Crowsnest Forest District	3	1

A Spruce Weevil, *Pissodes* sp.—All infestations of this insect on white spruce mentioned in last year's report had decreased in severity in 1951.

	Collections	Reports
Kootenay National Park	3	1
Waterton Lakes National Park	1	1
Crowsnest Forest District	1	1
Clearwater Forest District		1

Grey Pine Looper, *Caripeta angustiorata* (Wlk.).—No conclusions can be set down for this insect on lodgepole pine in the Jasper National Park because the area was not sampled as thoroughly as in 1950. Available data suggest a reduction in population.

	Collections	Reports
Jasper National Park	25	
Banff National Park	4	
Yoho National Park	1	
Waterton Lakes National Park	2	
Brazeau-Athabasca Forest District	21	
Clearwater Forest District	11	
Bow River Forest District	10	
Crowsnest Forest District	9	

Western Tent Caterpillar, *Malacosoma pluviale* (Dyar).—Defoliation by this insect was scattered and quite spotty. Nests were fairly common near Little Buffalo Ranger Station in Wood Buffalo Park but the heaviest population seen in this area was near Rocher River Settlement on Great Slave Lake.

	Collections	Reports
Waterton Lakes National Park	1	
Crowsnest Forest District	4	
Clearwater Forest District	2	
Northern Alberta Forest District	9	
Northwest Territories		1

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.—Several infestations of the forest tent caterpillar have been reported this season after a number of years in which no outbreaks were recorded. The largest of these infestations was west of Rimbey (tps. 42 and 43, rges. 5 and 6, west 5th mer.) where complete defoliation of aspen was observed on all ridges and hills and about two-thirds defoliation in the valleys. On the southwest quarter of sec. 6, tp. 41, rge. 5, west 5th mer., a 5-acre area of aspen was completely defoliated. A light infestation

of this insect was reported by Assistant Timber Inspector J. B. Roy on secs. 33 and 34, tp. 42, rge. 7 west 5th mer. Another light infestation was noted in sec. 35, tp. 40, rge. 6 in this area. Besides these outbreaks in or near the Clearwater forest district, there was a light one in the Brazeau-Athabasca forest district, and a heavy one in the northern Alberta forest district. The former of these two was about 6 miles south of the McKay corner. The latter was approximately 30 miles northwest of Smith, where complete defoliation of aspen took place. A number of these larvae were found in the Whitecourt area of this northern forest district.

	Collections	Reports
Waterton Lakes National Park	1	
Bow River Forest District	1	
Clearwater Forest District	113	4
Brazeau-Athabasca Forest District	5	1
Northern Alberta Forest District	10	1

NORTHERN FOREST INSECTS

Besides the infestations of the spruce budworm, black-headed budworm, and western tent caterpillar, other insect damage on trees was noted in the Wood Buffalo Park and Great Slave Lake areas of northeastern Alberta and the Northwest Territories.

A Spruce Budworm, *Zeiraphera fortunana* Kft.—This insect was found at Hay River and Reliance. At the latter point, which is 30 miles south of the spruce tree limit, larvae were feeding on spruce in sufficient numbers to constitute a light outbreak.

Spruce Needleworm, *Dioryctria reniculella* (Grt.).—This species was found in association with the spruce budworm and black-headed budworm throughout the area inspected. The Ft. Chipewyan district had a high population on white spruce, the larvae feeding on both the cones and foliage. At Yellowknife, the larvae were feeding within immature white spruce cones.

Large Aspen Tortrix, *Archips conflictana* Wlk.—Severe outbreaks of this insect were examined near Ft. Smith and Hay River. Wherever aspen occurred in these localities, the defoliation varied from light to heavy. Near Ft. Smith, the larvae were observed to feed on willow, highbush cranberry, Labrador tea, and white and black spruce. The flight period lasted from June 30 to July 14. Parasites were seen in large numbers within the infested area. Near Hay River, the outbreak was in its third consecutive year and the aspen had suffered considerable mortality.

Balsam Fir Sawfly, *Neodiprion abietis* (Harr.).—This sawfly was common in Wood Buffalo Park and near Ft. Smith townsite. A number of larvae were found near Rocher River.

Alaska Spruce Beetle, *Dendroctonus borealis* Hopk.—This bark beetle was found in fresh stumps from the southern portion of Wood Buffalo Park to Reliance. In all places examined the population was endemic and no healthy spruce trees were attacked.

Bark Beetles, *Ips borealis* Sw. and *I. perturbatus* Eich.—These two bark beetles were found in association on every fresh spruce log examined. Their activities were confined to cut logs and to injured standing spruce.

Cooley Spruce Gall Aphid, *Adelges cooleyi* (Gill.).—This insect was found throughout the region but there was no severe damage.

LIST OF CO-OPERATORS

ALBERTA FOREST SERVICE

Crowsnest Forest District

Name	Collections	Name	Collections
Eckert, R. R.	2	Meister, M.	1

Clearwater Forest District

Name	Collections	Name	Collections
Enright, C. E.	7	Radke, D. S.	4
Miller, D.	1	Verhaeghe, M.	11

Brazeau-Athabasca Forest District

Name	Collections	Name	Collections
Buck, D.	1	Dino, A. R.	3
Crawford, A. C.	3		

Northern Alberta Forest District

Name	Collections	Name	Collections
Adams, J. W.	1	Holden, J.	9
Bradley, W.	1	Parnall, H. W.	2
Burton, J.	1	Plews, W.	3
Champion, D. J.	3	Roy, J. B.	1
Dawson, E. R.	4	Smith, F. E.	7
Farrell, T.	1	Smuland, R.	1

DOMINION NATIONAL PARKS SERVICE

Banff National Park

Name	Collections	Name	Collections
Black, W.	5	Stenton, J. E.	3
Carleton, E. C.	5	Woodworth, P. G.	3
Romanson, J.	2		

Jasper National Park

Name	Collections	Name	Collections
Burstrom, F.	10	McGee, J. B.	7
Camp, G. E.	6	Minkensky, N.	18
Christiansen, J. M.	7	Ross, T. L.	5
Johnson, W. C.	3		

Yoho National Park

Name	Collections	Name	Collections
Nicholson, C. V.	4	Tocher, J.	3

Kootenay National Park

Name	Collections	Name	Collections
Briars, A. G.	3	Thompson, R. W.	4
Brooks, G. L.	1		

Glacier National Park

Name	Collections
Gardner, A. C.	4

Mount Revelstoke National Park

Name	Collections	Name	Collections
Burkitt, J.	3	Crowle, D.	6

LIST OF CO-OPERATORS—Continued

Waterton Lakes National Park

Name	Collections	Name	Collections
Hand, R.	1	Shideler, G. J.	4

DOMINION FOREST SERVICE

Name	Collections
Quaite, J.	8

DOMINION FOREST AND WILDLIFE MANAGEMENT (N.W.T.)

Name	Collections	Name	Collections
Marsh, A. H.	3	Pallen, A.	1

SASKATCHEWAN DEPARTMENT OF NATURAL RESOURCES

Name	Collections	Name	Collections
Johnson, B. A.	1	MacNeill, W.	4

PRIVATE CO-OPERATORS

Name	Collections	Name	Collections
Harbourne, J.	8	Simms, W.	1
McGuffin, W. C., Jr.	1	Smith, O. C.	1
McNeill, D.	1		

DOMINION FOREST INSECT LABORATORY

Name	Collections	Reports
Anderson, A. E.	133	3
Barclay, P.	9	
Cook, J. A.	2	1
Kusch, D. S.	8	
LaRue, P. F.	606	14
MacLeod, J.	1	
McGuffin, W. C.	9	
McNeil, E. J.	1,046	19
Reid, R. W.	38	1
Robins, J. K.	742	18
Shepherd, R. F.	1	
Stanley, R. R.	618	14
Stark, R. W.	5	3
Thornton, E. F.	623	17
Watson, J.	8	


ENTRANCE
JASPER
BRAZEAU RIVER
NORTH SASKATCHEWAN RIVER
ROCKY MT. HOUSE
CLEARWATER RIVER
RED DEER RIVER
N
FIELD
BANFF
BOW RIVER
CALGARY
KANANASKIS FOREST EXPERIMENTAL STATION
RADIUM HOT SPRINGS
CALGARY LABORATORY
FOREST INSECT SURVEY 1951
ROCKY MOUNTAIN REGION
INFESTATION OF THE
LODGEPOLE NEEDLE MINER
HEAVY
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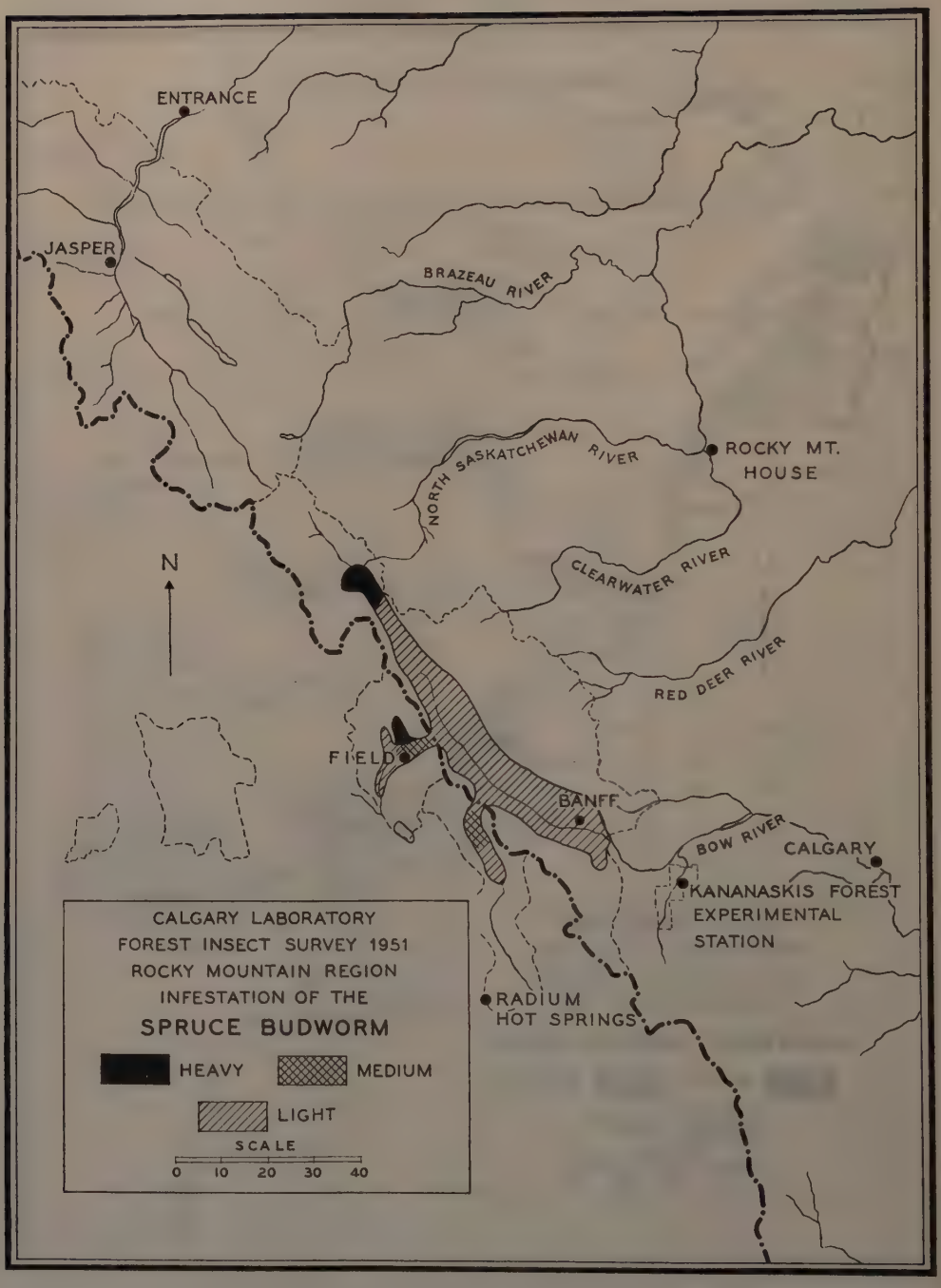
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CALGARY
KANANASKIS FOREST EXPERIMENTAL STATION
RADIUM HOT SPRINGS
CALGARY LABORATORY
FOREST INSECT SURVEY 1951
ROCKY MOUNTAIN REGION
INFESTATION OF THE
SPRUCE BUDWORM
HEAVY
MEDIUM
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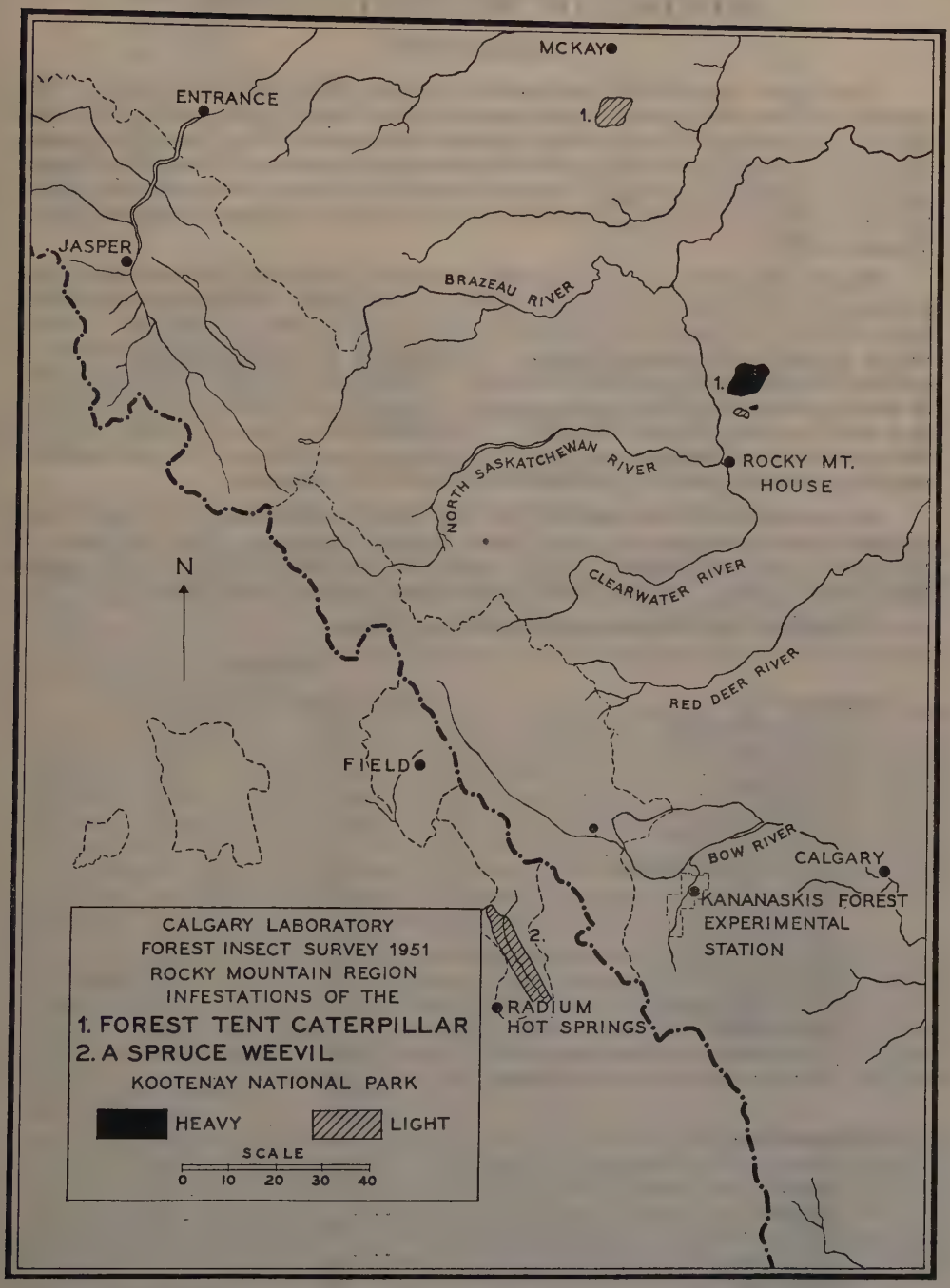

MCKAY
ENTRANCE
1.
JASPER
BRAZEAU RIVER
1.
NORTH SASKATCHEWAN RIVER
ROCKY MT. HOUSE
N
CLEARWATER RIVER
RED DEER RIVER
FIELD
BOW RIVER
CALGARY
KANANASKIS FOREST EXPERIMENTAL STATION
2.
RADIUM HOT SPRINGS
CALGARY LABORATORY
FOREST INSECT SURVEY 1951
ROCKY MOUNTAIN REGION
INFESTATIONS OF THE
1. FOREST TENT CATERPILLAR
2. A SPRUCE WEEVIL
KOOTENAY NATIONAL PARK
HEAVY
LIGHT
SCALE
0 10 20 30 40

PROVINCE OF BRITISH COLUMBIA

INTRODUCTION

The report that follows is presented in two parts; the first dealing with collections from the coastal forests assembled by survey personnel at Victoria, the second covering collections from interior forests east of the Coast Mountains, handled by survey personnel at the Vernon sub-laboratory. Samples of insect specimens collected during the summer totalled 6,316 as compared with 6,317 in 1950. The 1951 total collections are divided as follows: Victoria 2,961, Vernon 3,355.

The survey work on the coast was extremely handicapped because of the prolonged forest closure during the period of drought. This closure extended from mid-July to the end of September, during which time no one was allowed in the woods in the areas affected. This resulted in very poor distribution of collections and caused continued changing of programs and shifting of personnel. A much greater reduction in the number of coastal collections was anticipated as a result of this difficult situation. More significant than the slight drop in the number of collections was the reduction in the value of the information resulting from the limited distribution of the survey samples.

An important development in the year was the initiation of the collection of pathological specimens for the Unit of Forest Pathology. This extension of the survey was undertaken by the rangers in conjunction with their regular forest insect work. A total of 339 pathological samples was submitted.

Collections for 1951 are summarized as follows:

	Collections	
Coniferous hosts	Interior Region	Coastal Region
Cedar, western red	50	314
Douglas fir	976	613
Fir, alpine	309	71
Fir, amabilis	.....	169
Fir, grand	14	58
Hemlock, western	216	939
Juniper, dwarf	3	.....
Juniper, rocky mountain	27	.....
Larch, eastern	3	.....
Larch, western	192	.....
Pine, lodgepole	230	89
Pine, ponderosa	228	11
Pine, western white	41	41
Spruce, black	28	1
Spruce, Engelmann	196	.....
Spruce, Sitka	.....	140
Spruce, white	243	163
Yew	3	.....
	2,759	2,609
Deciduous hosts		
Alder	62	122
Apple	2	.....
Arbutus	.....	16
Birch	91	6
Cascara	.....	5
Cherry, choke	26	.....
Cherry, pin	6	.....
Cottonwood	26	6
Dogwood	6	5
Hazel	2	.....

Deciduous host	Collections	
	Interior Region	Coastal Region
Maple, bigleaf	.....	14
Maple, Douglas	5	.....
Mountain ash	3	.....
Oak, Garry	.....	36
Poplar, trembling aspen	130	9
Poplar	.....	5
Saskatoon	15	.....
Spiraea	3	.....
Willow	107	37
	484	261
Miscellaneous	112	91
Total	3,355	2,961
Grand Total		6,316

IMPORTANT INSECTS—BRITISH COLUMBIA

COASTAL FORESTS

D. Evans and E. D. A. Dyer

Dominion Forest Insect Laboratory, Victoria, B.C.

Spruce Budworm, *Choristoneura fumiferana* (Clem.).—In 1951, spruce budworm populations occurred on the southern British Columbia coast and near Burns Lake, inland from Prince Rupert. In the former area a scattered, incipient population of 1-year-cycle budworm was found on Douglas fir while in the latter a large outbreak of 2-year-cycle budworm continued to infest stands of spruce and alpine fir.

In southeastern Vancouver Island, spruce budworm has probably been present since the last small outbreaks in 1909 and 1927 near Victoria, Duncan, and Nanaimo. During 1949 and 1950, only a few larvae were found throughout all the southern coastal area but in 1951, the number of budworm collections from this area increased significantly. Most collections contained only 1 or 2 larvae but 10 collections from one small area near Hope contained an average of 3·5 larvae each. The greatest increase in the number of budworm collections occurred on Vancouver Island between Sooke and Parksville including the Soanich Peninsula and the adjacent islands in the Gulf of Georgia.

In the Burns Lake area almost all the spruce budworm occurred as second or third-instar larvae in the first year of their 2-year cycle. These larvae formed over-wintering hibernacula and became dormant by the middle of July. Very slight damage was apparent on nearly all the new buds which were webbed and partly destroyed by the insects. The comparative density of larval population was determined by bud sampling in the strip plots that were established in 1950.

A slightly larger population than last year was found in the area between Burns Lake and Babine Lake. The area of infestation was greater than in 1950 because of a slight population spread to the north and west. Adjacent to this outbreak, new areas of infestation were discovered between Fort St. James and the Nation River. This indicates that the Burns Lake-Babine Lake outbreak is becoming a part of the very large infestation throughout the Prince George district.

A total of 1,705 specimens was received at the insectary from the Burns Lake area. The majority of the larvae were in the second or third instars but

a few were nearly mature. It is uncertain whether these few mature larvae represented a population of the 1- or 2-year strain. There was little evidence of disease or parasitism in any of the spruce budworm rearings.

District	Number of Collections 1950	Number of Collections 1951
Northern Vancouver Island	12	14
Southern Vancouver Island	5	29
Lower Fraser River Valley	9	10
Prince Rupert District	124	92

Collections: 145.

A Spruce Tip Moth, *Zeiraphera diniana* Gn.—Ninety-two larvae from 28 collections were found on white spruce in the Prince Rupert forest district. These larvae occurred on the westerly fringe of the large spruce budworm outbreak near Burns Lake. The population extended from Rose Lake to Burns Lake and occasional specimens occurred at Augier Mountain, Priestley, and Ootsa Lake. Damage was light. About 14 per cent of the larvae were parasitized. Collections: 28.

Western Hemlock Looper, *Lambdina fiscellaria lugubrosa* (Hlst.).—Collections of this looper from most parts of the coast indicated a small, well dispersed population similar to that of 1950. Fewer larvae were found in the lower Fraser River Valley and on the east coast of Vancouver Island although less collecting was done in these districts during the period of larval activity. On the west coast of Vancouver Island from Sidney Inlet to Kyuquot Sound single larvae were common in collections. Similar populations occurred throughout the Johnson Strait islands and in the Bella Coola region. No specimens were received from the Prince Rupert district.

In areas where collecting was completely prohibited because of forest closure, no information was gathered from July 12 until mid-September. It is likely that if normal collecting had been allowed, more specimens of hemlock looper would have been found in the areas where it occurred in 1950. The incidence of disease and parasitism was very low in the larvae reared at the insectary. Collections: 70.

Green Velvet Looper, *Oporinia autumnata* (Gn.).—This geometrid did not appear to be so prevalent as it was last year. Many of the areas, particularly at higher elevations where the largest populations occurred in 1950, were closed to the survey through most of 1951. The insect was most numerous on northwestern Vancouver Island although there was a uniformly low population in most of the southern coastal region. A few tachinid parasites, as yet unidentified, were recovered from laboratory rearings. Collections: 101.

Green-Striped Forest Looper, *Melanolophia imitata* (Wlk.).—This species was very prevalent throughout the southern half of the British Columbia coastal area. It was particularly abundant over the entire west coast of Vancouver Island and the largest population was recorded in the Barkley Sound area. Collections as high as 100 larvae per sample were recorded at Henderson Lake and Sarita River but despite the larval abundance, no damage was observed. These concentrated populations, infected by fungus and bacterial disease in the field, suffered over 90 per cent mortality in some of the laboratory rearings. There was approximately 6 per cent mortality from parasitism. In close association with *M. imitata* were large numbers of *Nyctobia limitaria nigroangulata* Stkr. and *Neodiprion tsugae* Midd. Collections: 714.

Red-headed Looper, *Enypia packardata* Tayl.—This is the first survey season in which this insect has appeared in large numbers. It is now sparsely distributed along all the coast and is apparently increasing on northern Vancouver Island where it was originally observed in the 1947 survey. In 1951, nearly one-third of the collections made on hemlock and Douglas fir in that area, contained specimens of *Enypia packardata.* This geometrid over-winters in the larval stage. Collections: 197.

Oak Looper, *Lambdina somniaria* (Hlst.).—A decline in the population of this insect was recorded for the second successive year. Examination of egg samples collected in the Victoria area in early April revealed that one-third of the samples were negative. In 1950, the standard egg samples averaged 280 eggs each and 36 per cent of the eggs hatched. In 1951, only 3 of the samples contained more than 20 eggs and of these less than 5 per cent hatched. The larval population was the lowest since the beginning of the current outbreak and defoliation of Garry oak was slight. Approximately 24 per cent of the larvae were parasitized by an unidentified tachinid. Collections: 24.

Yellow-lined Forest Looper, *Nyctobia limitaria nigroangulata* Stkr. This insect occurred in many of the collections from the west coast of Vancouver Island. The largest collections contained as many as 70 larvae associated with large numbers of *Melanolophia imitata* at Sarita River and Pachena Lake. A few specimens were found in the lower Fraser River Valley. Western hemlock was the preferred host tree. Collections: 213.

Striped Alder Sawfly, *Hemichroa crocea* (Fourc.).—The spring brood of alder sawflies was scarce and few specimens were found in the field surveys. One small population persisted at Beaver Point, Salt Spring Island and another at Oyster Bay near Courtenay. A second generation developed feebly in some parts of its former range but at Campbell River and Powell River the insect was very scarce. Information could not be obtained this year from the Queen Charlotte Islands where this sawfly was active in 1950. Collections: 20.

Hemlock Sawfly, *Neodiprion tsugae,* Midd.—There was a slight decline in the numbers of hemlock sawfly throughout the coastal districts for the second successive season. Although the population was more evenly distributed than in previous years, some localities contained moderate concentrations. On southern Vancouver Island, at Poett Nook and Pachena Lake a considerable population was associated with *Melanolophia imitata* (Wlk.). There was a marked decline in numbers in those areas adjacent to Port Alice where dense populations were recorded in 1949 but the insect remained active nearby, in the Holberg Inlet area. Much of the information from Port Alice and Holberg Inlet was contributed by W. McGhee, D. Biggs, and M. Ayers of the Alaska Pine and Cellulose Company, Limited. Samples from the Sayward district of Northern Vancouver Island indicated an evenly dispersed population. Large numbers of this insect were encountered farther north on the mainland coast at Smith, Draney, and Rivers inlets. Very few specimens were found in the Prince Rupert district and the southern mainland population was sparse. In no instance was damage from this insect observed.

District	Number of Collections	Average number of larvae per collection
Northern Vancouver Island	74	13·8
Southern Vancouver Island	36	13·7
Lower Fraser Valley	43	5·6
Smith Inlet	25	14·0
Prince Rupert	5	1·2

Douglas-fir Pyralid, *Promylea lunigerella* Rag.—This insect was evident on Douglas fir on the southern Gulf Islands. At Saturna Island as many as 10 larvae were taken in single collections. The insect was scarce elsewhere and John Dean Park was the only location on Vancouver Island where it was found. Collections: 34.

A Web-spinning Tortricid, *Argyrotaenia pinatubana* Kft.—Survey samples indicated an increase in the population of this tortricid. Most of the insects were from grand fir in the immediate vicinity of Campbell River, although a few specimens were received from Texada Island and Britain River. No larvae were found on the southern mainland where they occurred on lodgepole pine in 1950. Collections: 20.

Tent Caterpillars, *Malacosoma* spp.—There were no current reports of damage by either *M. pluviale* (Dyar) or *M. disstria* Hbn. in the coast districts. Except for one collection from Quatsino, the few specimens received at the laboratory showed little evidence of parasitism or disease. Collections: 11.

Douglas-fir Beetle, *Dendroctonus pseudotsugae* Hopk.—No reports of any appreciable damage by this bark beetle were received from the southern coastal districts although collections were made at Grant Lake and Britain River. In the Prince Rupert district at Babine Lake, a small infestation covering 20 acres occurred in a residual stand of Douglas fir following selective cutting of 210 acres. Although some migration of the beetles was noted, extensive damage is unlikely as no other Douglas-fir stands occur in that area. Collections: 6.

Ambrosia Beetle, *Trypodendron cavifrons* Mannh.—Mr. H. D. Kermode, of the A. P. L. Sawmills at Port Alberni reported these beetles boring in the sapwood of piled, green Douglas-fir lumber. These insects were also found in windthrown hemlock at Kelsay Bay and at scattered points over most of the southern coast. Collections: 9.

IMPORTANT INSECTS—BRITISH COLUMBIA INTERIOR FORESTS

D. A. Ross and P. A. Jonès

Dominion Forest Insect Laboratory, Vernon, B.C.

Spruce Budworm, *Choristoneura fumiferana* (Clem.).—Empirical observations indicated that populations of the spruce budworm continued to build up in the interior of the Province. A quantitative comparison of the infestation density of 2-year-cycle budworm for two successive years is rather impractical in that comparisons would be made between infestations of early instar and late-instar larvae. Feeding damage is rather obscure during the odd-numbered years, e.g. 1951, when the 2-year-cycle budworm develops from the second to about the fourth instar, making it difficult to detect extensions of infestations by rapid surveys.

Branch sampling during 1951 indicated an expansion of some infested areas in the Fort George Forest District, notably, the Crooked River Valley infestation which has spread into the Summit Lake area. Similar sampling methods demonstrated the occurrence of light infestations in the following areas, that were not sampled in 1950: on the Manson Creek Road from the Pinchi Lake turnoff to the Nation River in the spruce-balsam forest and in the spruce understory in the lodgepole-pine stands; on the ridge between Pinchi and Tezzeron lakes; about the 3,000 foot level between Buckhorn Lake and Willow River; between Willow River and Wansa Creek; along either side of the Fraser River at

Penny, in the balsam-spruce reproduction in a cedar-hemlock stand; on Mouse Mountain, east of Quesnel; and in a spruce-balsam stand about 10 miles north of Prince George.

The 1-year-cycle budworm population increased slightly in the Douglas-fir stands of the interior. The following table indicates the relative abundance and population status change in the various districts according to the data from random beating samples during the period of larval activity:

District	Collections from Douglas fir	Percentage containing spruce budworm	Status change 1950-1951
East Nelson	55	2	− 2
West Nelson	44	11	+ 4
East Kamloops	105	34	+18
West Kamloops	119	47	+26
Fort George	19	21*	− 3

* Some specimens may have been 2-year-cycle budworm.

The 1-year-cycle budworm infestation in Fountain Valley near Lillooet persisted.

No infestations of budworm were observed on lodgepole pine. The number of beating samples from lodgepole pine, between June 16 and August 1, and the number of these samples containing budworm larvae for each forest district is as follows: Nelson, 48-1; Kamloops, 40-5; and Fort George, 13-6.

Mountain Pine Beetle, *Dendroctonus monticolae* Hopk.—The severe infestations in white-pine stands along the Big Bend Highway at Downie Creek (Mile 42), at Mile 47, and south of Goldstream River (Mile 54) continued unabated. Unfortunately, certain difficulties at present make the presalvage or salvage of trees along the Big Bend Highway impracticable. The removal of the larger white pine timber in an infested area, near Revelstoke, has locally reduced the mountain-pine beetle hazard.

Active infestations, old and new, were observed at various points about Upper Arrow Lake. Groups of infested trees are scattered over an expanse about 5 miles long by 2 miles wide, along Little Fish Creek. In older sections of the infestation more than 90 per cent of the white-pine trees over 6 inches D. B. H. have been killed, especially where there are relatively high proportions of white-pine stems. Smaller areas of more recent infestations occur in the following localities about Upper Arrow Lake: on the northeastern slope of Sugarloaf Mountain; northwest of Shelter Bay; on the southeast slope of Pingston Ridge; between Albert Point and Nacillewaet Creek; on Mount Sproat, in patches on the western and southern slopes; between Northeast Arm and Galena Bay; and on the west shore of the lake directly opposite Nakusp. Small scattered groups of trees in the forest between Arrow Park and Graham Landing were also infested with bark beetles but much of the recent damage was the work of disease organisms.

More than 50 per cent of the white-pine timber in the infested portions of the forest about Seymour and Anstey arms of Shuswap Lake has been destroyed, ostensibly by the mountain pine beetle. The Shuswap Lake infestations shown on the appended map, excepting the one on the east side of Anstey Arm, have spread. The former spotty infestations on the west shore of Seymour Arm, between Cape Horn and a point 8 miles northward, have coalesced, forming the most extensive infestation about Shuswap Lake. Relatively small pockets of currently infested trees occur: near Beach Bay, at Cinnemousun Narrows, on the mountain-slope northwest of Cambie, and between Meadow Creek and Magna Bay.

Three newly reported infested stands at the north end of Adams Lake cover 60, 10, and 8 acres. No green, infested trees were observed in these stands in July, although larvae, pupae, and adults were present in trees attacked in 1950.

In the Blue River forest ranger district, several small patches of white pine between Messiter and Blue River were infested by the mountain pine beetle.

There was little or no expansion of the infested lodgepole-pine areas in the East Nelson district during 1951. The mountain pine beetle was still fairly active in the Steamboat Mountain, Windermere Creek, and Whitetail Lake regions. The few green, infested trees present in the old infestations along Frances-Forster creeks, Toby Creek, Elk Creek (White River Basin), and Elk River bore evidence of high beetle mortality.

The mountain pine beetle was active again in mature ponderosa pine in the Aspen Grove region, the site of a severe outbreak about the year 1930: 31 "red tops" and 42 newly attacked trees were counted in the vicinity of Alleyne Lake during October, 1951.

Douglas-fir Beetle, *Dendroctonus pseudotsugae* Hopk.—Small groups of infested trees were observed at scattered points throughout the range of the Douglas fir.

Douglas-fir Tussock Moth, *Hemerocampa pseudotsugata* McD.—No specimens of this periodically-important pest were collected during 1951.

Western Hemlock Looper, *Lambdina fiscellaria lugubrosa* (Hlst.).—A sparsely scattered population persisted.

False Hemlock Looper, *Nepytia canosaria* (Wlk.).—Populations of this species remained in endemic proportions.

Larch Sawfly, *Pristiphora erichsonii* (Htg.).—The larval population remained at a very low level. A native *Pristiphora* sp. of larch was distributed in endemic numbers throughout its host's range in the southern interior of the Province. No serious infestations of the native species have ever been reported.

Satin Moth, *Stilpnotia salicis* (L).—Forest Ranger H. A. Ferguson reported an infestation of satin moths in the West Kamloops District, near Currie Lake, the most easterly point of spread of this introduced insect. A general survey established the fact that severe defoliation was limited to a small isolated grove of trembling aspen in open range country.

Cooley Spruce Gall Aphid, *Adelges cooleyi* (Gill.)?—The population was generally light and no noteworthy damage was recorded.

Engelmann Spruce Weevil, *Pissodes engelmanni* Hopk.—Engelmann and white spruce reproduction in certain portions of the Fort George and West Nelson districts were attacked by this weevil during 1951. About 30 per cent of the sparsely-growing spruce along Manson Creek, and about 5 per cent of the spruce saplings along the fringe of a "burn" 8 miles east of Hixon Creek Post Office were infested. Open-grown spruce along the Fraser River east of Prince George appeared to be particularly susceptible, for trees as large as 5 inches D. B. H. were attacked. The most widespread areas of weevil injury are: the 1927 Red Mountain "burn", three miles northeast of Penny; and along the

Fraser River, from Lindup to Penny. In the West Nelson District, the most severe injury to 1950 growth was observed in the vicinity of Greenwood notably on spruce regeneration in an old "burn".

Ranger C. R. Tippie, of the B. C. Forest Service, reported a northward extension of the infestation of *Pissodes* sp. in spruce reproduction along the Kootenay River, beyond the northern boundary of Kootenay National Park. Light infestations occurred along Findlay Creek, west of Canal Flats and along Elk River, 25 miles north of Natal.

Hemlock Sawfly, *Neodiprion tsugae* Midd.—No change in the low population status of this sawfly was evident. Populations were sporadically distributed.

A Sawfly on Douglas Fir, *Neodiprion* sp. *abietis* group.—A light to medium infestation was observed over a 100-acre area of pole-sized Douglas fir near Squilax, in the East Kamloops District. Almost all the 1951 needles on the Douglas-fir understory reproduction were injured by the sawfly larvae. Feeding was less severe on the older trees and was concentrated on the lower third of their crowns. Apparently, the population in this area will be quite low next year for few cocoons and no new eggs were discovered in September, 1951. The 1950 growth of sample trees, 5 inches D. B. H. with 30-foot crowns, bore an average of 37 groups of old eggs.

Although little defoliation by this sawfly was observed elsewhere in the Kamloops Forest District, the populations were higher than in recent years at Scotch Creek, Adams' River bridge, Oyama Mountain, Harper Lake Road, Nisconlith Indian Reserve, and Scheidam Flats. During the larval feeding period, about 60 per cent of the random collections from Douglas fir in the East Kamloops district contained larvae of *Neodiprion* sp.; in the other insect ranger districts, the percentage ranged from about 20 to 35.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.—Outbreaks of the forest tent caterpillar developed in the East Nelson and Fort George districts during 1951. Heavy defoliation of popular and birch trees occurred in the following areas of the East Nelson district: Nicholson, 2,000 acres; Parson, 2,000 acres; Brisco, 1,000 acres; and Sinclair Creek, 15 acres. Medium to heavy defoliation occurred in the following areas of the Fort George district: along the Yardley Lake Road, southeast of Canyon Creek Post Office, 1,000 acres; Woodpecker, 300 acres; 6 miles east of the Cariboo Highway on the road to Wells, 200 acres; and in the McBride ranger district, 50 acres. A spotty infestation appeared over an area at least 2 miles in breadth between Wells Road and Cottonwood River. Several other species of defoliators including *Archips conflictana* (Wlk.), were commonly associated with this tent caterpillar in all these areas. In general, the infestations in the East Nelson district were more severe than those in the Fort George district; parasitism, disease, and starvation reduced the population in East Nelson more effectively than it did in the Fort George district.

Forest tent caterpillar egg-mass counts were made on sample trees in the fall of 1951 at points where infestations had been heavy. A sample from each location included three trembling-aspen trees, 6 to 8 inches D. B. H., with crown lengths ranging from about 20 to 25 feet. The results are presented in the following table:

AVERAGE NUMBER OF FOREST TENT CATERPILLAR EGG MASSES ON SAMPLE TREMBLING ASPEN TREES, SEPTEMBER, 1951

Location	Average D. B. H.	Average number new egg-masses per tree
East Nelson:		
Parson	6	14
Parson	8	8
Nicholson	6	10
Brisco	?	14
Fort George—		
Woodpecker	7	66
Yardley Lake	7	54
Barlow Creek	7	61
Barlow Creek	7	36

According to observations made at Sault Ste. Marie, Ontario, "larvae emerging from 10 or more clusters on trees averaging about 6 inches in diameter —will cause heavy defoliation."* If this applies to the forest tent caterpillar in British Columbia, heavy defoliation may be expected in these same localities during 1952.

Ranger Shutz reported a localized infestation in a rather inaccessible area near Valemont, West Kamloops district.

Western Tent Caterpillar, *Malacosoma pluviale* (Dyar).—A light infestation occurred in scattered clumps of cherry, currant, rose, and willow plants on Anarchist Mountain and on antelope bushes in the valley, east of Osoyoos. Wild roses in the Windermere Valley were also lightly infested.

A Tent Caterpillar, *Malacosoma* sp., near *pluviale* (Dyar).—The larvae of this insect, which closely resemble a dark phase of the larvae of *Malacosoma pluviale*, caused light defoliation at various points in the Fort George district, namely: Williams Creek, Nelsonkenny Creek, Canyon Creek, Stone Creek, Cluculz Lake, and the area between Summit Lake and Altezega Creek. Without exception, this tent caterpillar was confined to scrub birch and willow bordering or within swamps and muskegs.

Spotless Fall Webworm, *Hyphantria textor* Harr.—Light, sporadically-distributed populations were observed in portions of the East Kamloops and West Nelson districts.

Lodgepole Needle Miner, *Recurvaria* sp.—A light infestation persisted in the young lodgepole-pine stands near Squilax.

A Poplar Sawfly, *Nematus nigriventris* (Curran).—During the spring of 1951, a heavy poplar-sawfly population reappeared in a mature stand of black cottonwood near Shuswap Falls; undetermined factors greatly reduced the number of larvae in the early instars.

A Birch Sawfly, *Arge pectoralis* (Leach).—A light infestation occurred in the East Nelson district between Nicholson and Golden. In the Narcosli Creek Valley, Fort George district, white-birch trees averaging 5 inches B. D. H., on a 10-acre area, suffered 20 to 100 per cent defoliation; understory hazel bushes were denuded. In the latter area fungous organisms destroyed a large proportion of late-instar larvae.

* Annual Report F. I. S. 1950, p. 45.

Poplar and Willow Borer, *Sternochetus lapathi* (L.).—This introduced weevil is generally distributed throughout the West Nelson district and in the vicinities of Creston and Wynndell in the East Nelson district. The heaviest concentration occurred in willow bushes along the Pass Creek Valley Road, north of Castlegar, and along the highway between Trail and Castlegar. A few specimens were taken at Enderby and Lumby in the East Kamloops district.

Large Aspen Tortrix, *Archips conflictana* (Wlk.).—Light infestations were observed in the mixed-aspen and lodgepole-pine forests along the Nazko Road (west of the Fraser River), and northeast of Quesnel. Larvae of this species were numerous in aspen about Shuswap Lake.

Ugly-nest Caterpillar, *Archips cerasivorana* (Fitch).—Localized light infestations were observed near Elko in the East Nelson district and Pavilion in the West Kamloops district.

Zelleria haimbachi, Busck.—The population of this needle feeder has been noticeably increasing in the Okanagan Valley since about 1947, until in 1951 it assumed severe infestation proportions in certain sections. Medium to heavy infestations occurred in yellow-pine stands near Westbank, about 70 acres, and on Campbell Mountain west of Penticton, about 900 acres, where reproduction up to about 15 feet in height lost almost all the new needles. Mature trees in these areas were less severely affected.

Black-headed Budworm, *Acleris variana* (Fern.).—The black-headed budworm was present in small numbers throughout much of the range of its host trees. Larvae were locally numerous in the following areas: E. C. Manning Provincial Park, on alpine fir and Engelmann spruce at the 4,000 foot level; in the Fort George Forest District, near the Pinchi Lake "turnoff" on the Manson Creek road, and 12 miles southwest of Prince George on spruce understory in a lodgepole-pine stand.

LIST OF CO-OPERATORS

BRITISH COLUMBIA COASTAL FORESTS

Prince Rupert District

Name	Collections	Name	Collections
Antilla, W. A.	2	Munro, J. F.	5
Benoit, I. J. M.	1	Perrier, A. J.	5
Benwell, W.	3	Piche, P. J.	2
Boy's Camp, Pinkut Lake	7	Portelance, J. H.	6
Brooks, F. T.	12	Ridler, T.	4
Brooks, R. L.	2	Smith, D. R.	1
Campbell, W. H.	1	Spooner, J. R.	1
Ewer, E. H.	1	Taft, L. G.	2
Hammer, H. B.	1	Tugnum, F.	3
Hindle, B. L.	3	Whalen, H. B.	1
Keefe, J. J.	6	Wilds, H. J.	4
Lindstrom, W. C.	1	Willan, J. H.	2

Vancouver District

Name	Collections	Name	Collections
Antonelli, J. N.	1	Brewis, D. W.	3
Armytage, G. G.	3	Brooks, T.	1
Aylett, R. W.	2	Browne, T. V.	1
Banks, W.	1	Cameron, C. H.	2
Beall, A. C.	3	Charnell, G. S.	5
Bell, W. A.	3	Chester, A.	1
Black, W.	3	Dean, S.	3
Blagg, T.	1	Donnelly, R.	2
Bodman, C. O.	2	Forrest, R. J.	5
Bourdin, R.	8	Fraser, R. A.	1

LIST OF CO-OPERATORS—Continued

VANCOUVERT DISTRICT—*Concluded*

Name	Collections	Name	Collections
Frost, S. C.	1	Mudge, M. H.	6
Garman, E. H.	1	Ormond, L. D. D.	5
Gilmour, A. M.	2	Parsey, R. R.	1
Ginnever, T. W.	1	Pringle, R. C.	4
Glassford, R. J.	5	Ranta, R.	2
Goodsell, D. R.	2	Rawlins, W. P.	5
Greenhouse, J. P.	2	Reaney, R. J.	2
Haddon, C. D.	5	Reith, W. D.	5
Haley, K.	2	Robinson, J. H.	4
Henderson, J. E.	2	Rockwell, I.	3
Hilton, B.	2	Rourke, R. J.	3
Howard, W.	3	Sacho, W. C.	1
Jansen, W. E.	3	Smith, R. H.	1
Jobbins, R.	1	Speer, R. C.	6
Jones, R. W.	4	Stevenson, H.	3
Kelsey, W. W.	2	Stritton, J. B.	1
Lawrie, A. T.	1	Stromber, R. J.	3
Layton, A. T.	1	Sutherland, H.	3
Little, J. O.	2	Sweatman, P.	1
Little, R.	3	Tannock, F.	6
Littleton, W. A.	1	Tennant, R. E.	3
Lonneberg, M.	3	Van Tine, D.	2
Lorentsen, L. H.	2	Van Tine, L. E.	2
Magel, H.	7	Wagner, C. J.	2
McIntyre, F. M.	1	Whiting, E. C.	1
Morley, K. A.	1	Wilson, R. J.	2

PRIVATE CO-OPERATORS

Name	Collections		Name	Collections	
Antonelli, K.	1		Jones, P.	1	
Antonelli, M.	1		Jones, R. D. (Mrs.)	1	
Ayers, M. J.	52	1*	Kennedy, L.	1	
Bancroft, H. G.	1		Kermode, H. D.	1	
Barrett, R. J.	2		Kirkendale, J.	2	
Biggs, D.	44		Leigh, J. A.	1	
Bodman, A.	1		McGhee, W.	31	2*
Breeden, S. C.	1		McIntosh, J. C.	1	
Christianson, G.	2		Mitchell, J.		2*
Critchley, S.	1		Parker, A. K.	3	
Dembicki, H.	1		Patterson, G.	4	
Duerkson, J.	1		Sharpe, W. G.	8	
Flynn, J. A.	1		Snowball, A. F.	1	
Frederickson, C. J.	1		Spilsbury, R. H.	1	
Graham, Dr. K.	1		Summerfield, J.	1	
Hepher, W. S.	1		Tipping, H.	1	
Izard, E. W.	1				

* Pathological collections.

DOMINION FOREST INSECT LABORATORY, VICTORIA, B.C.

Name	Collections		Name	Collections	
Allen, S. J.	457	19*	Jones, M. G.	9	
Brown, G. S.	1		Kinghorn, J. M.	11	
Collis, D. G.	747	28*	McHugh, G. J.	5	
Dyer, E. D. A.	82	11*	Radcliffe, D. N.	1	
Evans, D.	32		Richmond, H. A.	2	
Fairhurst, E.	1		Robertson, K. W.	476	8*
Fiddick, R. L.	103	4*	Smith, D. N.	1	
Gilkin, E.	17		Taylor, W. D.	417	18*
Harvey, E. G	499	27*	Thompson, M. G.	1	
Hughes, J. M. T.	388	26*	Tickle, F. M.	30	
Jones, G.	151	2*	Webb, W. E.	56	3*
Jones, G. M.	3		Whiting, P.	1	

* Pathological collections.

BRITISH COLUMBIA INTERIOR FORESTS

Kamloops District

Name	Collections	Name	Collections
Beckett, D. A. E.	1	McKenna, L. J.	2
Bird, R.	1	Mayson, H. G.	2
Boutwell, E. J.	7	Nelson W.C.	1
Cameron, A. C.	4	Nielson, P.	15
Cawston, A.	3	Ogilvie, W. H.	1
Christison, M. C.	1	Pement, A. R.	1
Crosby, D. N.	2	Pement, E. E.	1
Dodge, D. P.	1	Perrin, C.	2
Fitzgerald, G.	1	Sanderson, W. L.	1
Fraser, D. P.	1	Schutz, A. C.	8
Fraser, R. G.	1	Scott, E. L.	4
Hayhurst, J. W.	5	Specht, G.	2
Hill, A. F.	5	Spilsbury, R. H.	1
Hollingsworth, J. A.	21	Sutherland, G. S.	1
Janning, H. A.	5	Sweet, R. L.	1
Kettleson, O. J.	1	Weinard, H. P.	1
Kuly, A.	2	Weinard, J.	1
Lally, J. M.	1	Wittner, D.	5
McDonald. L. E.	1	Wooldridge, O. C.	1

Nelson District

Name	Collections		Name	Collections
Bailey, J. F.	5		Linton, S.	1
Butling, G. A.	1		McGuire, C. J.	1
Coles, H. J.	3		Moen, O. P.	1
Connoly, J. E.	5		Moore, K. W.	1
Crowther, D. B.	1		Old, G. F.	4
Day, D. W.	4		Palethorpe, G. C.	1
Gierl, J. B.	1	3*	Peterson, S. G.	2
Haggart, W. D.	1		Reid, E. W.	10
Hamilton, T. J.	1		Robinson, R. E.	1
Hesketh, A. E.	1		Ruzicka, S.	21
Hesketh, F. G.	3		Sandberg, H. G.	3
Holmberg, H.	1		Snider, J. I.	6
Hopkins, H. V.	24	11*	Tippie, C. R.	2
Isenor, M. G.	9		Tompkins, R. F.	1
Jones, L. K.	1		Uphill, W. T.	2
Kast, K. H.	6		Vince, M.	5
Kennedy, P. J.	2		Waller, T. G.	3
Killough, J. F.	5		Webster, G. R.	2

Fort George District

Name	Collections	Name	Collections
Angly, R. B.	2	Irwin, K.	3
Atkinson, H. E.	3	Irwin, W. J.	1
Bailey, J. D.	5	Jones, G. G.	1
Barbour, H. T.	3	Jones, O. D.	5
Bell, P. A.	5	Levangie, L.	2
Bennett, C. R.	3	MacAskie, I. B.	5
Brandner, V.	5	McKenzie, R. A.	6
Burrows, I. R.	1	McLean, D. M.	4
Cayford, J. H.	3	McQueen, L.	2
Chingy, H.	3	Mitchell, B. A.	3
Cook, H.	18	Mulholland, W. H.	1
Cosens, A. S.	3	Murphy, J. A.	2
Cuthbert, J. A.	1	Northrup, K. A.	5
French, C. L.	4	O'Meara, A. V.	3
Glew, D. R.	1	Painter, M. F.	14
Gross, G. G.	3	Paterson, G. A.	10
Haigh, W. L.	1	Patterson, R. I.	3
Halliday, C. T.	2	Perdue, J. E.	2
Hamilton, H. D.	5	Ramage, W.	2

* Pathological collections.

LIST OF CO-OPERATORS—Continued

Fort George District—*Concluded*

Name	Collections	Name	Collections
Shires, F.	3	Turner, L.	3
Smith, A.	2	Verigin, S.	2
Smith, W. H.	5	Wall, C. J.	2
Solonas, A.	1	Warren, R.	2
Specht, A. F.	2	Willis, J.	1
Thompson, A. M.	1	Wilson, J. A.	2
Threatful, N.	2		

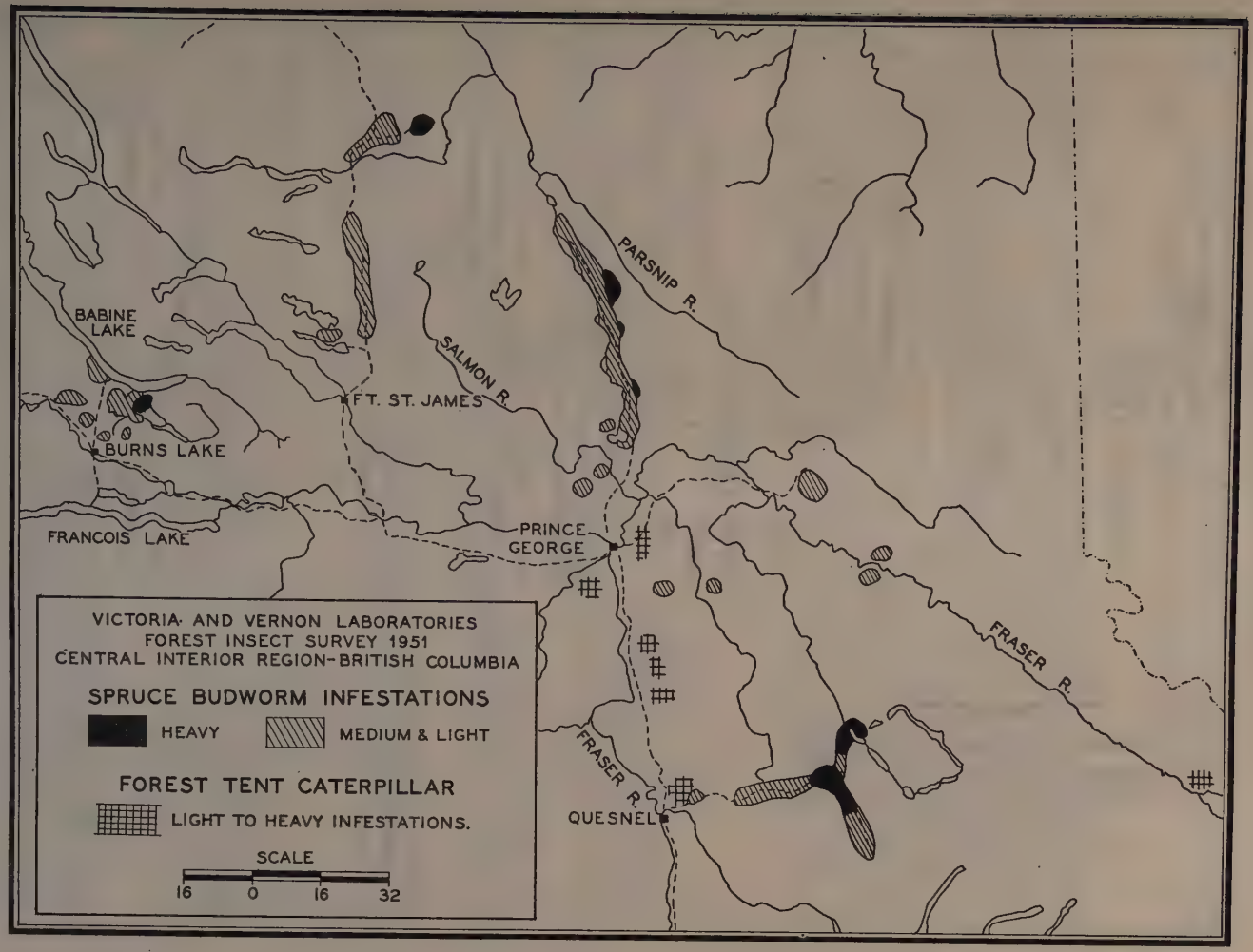
MISCELLANEOUS AND PRIVATE CO-OPERATORS

Name	Collections	Name	Collections
Bailey, F.	2	Nielson, C. L.	3
Dyson, T. D.	1	Weatherhead, G. E.	1
McKim, W. J.	1	Taylor, R.	1
McKirdy, W. L.	1	Taylor, T.	1
Molnar, A. C.	2		

DOMINION FOREST INSECT LABORATORY—VERNON, B.C.

Name	Collections		Name	Collections	
Bitz, W. E.	330	4*	Mathers, W. G.	24	
Brown, G. S.	7		Randall, A. P.	1	
Burch, J.	51		Ross, D. A.	24	
Campbell, D. K.	3		Ruppel, D. H.	543	16*
Cottrell, C. B.	291	43*	Rutherford, T.	2	
Dyer, E. D.	100		Simms, W. G.	640	23*
Farris, S. H.	143	6*	Sugden, B. A.	617	7*
Fiddick, R. L.	128		Wallington, L.	139	
Grant, J.	646	43*	Whitecross, A. F.	496	2*
Jones, P. A.	22		Wood, P. I.	297	30*

* Pathological collections.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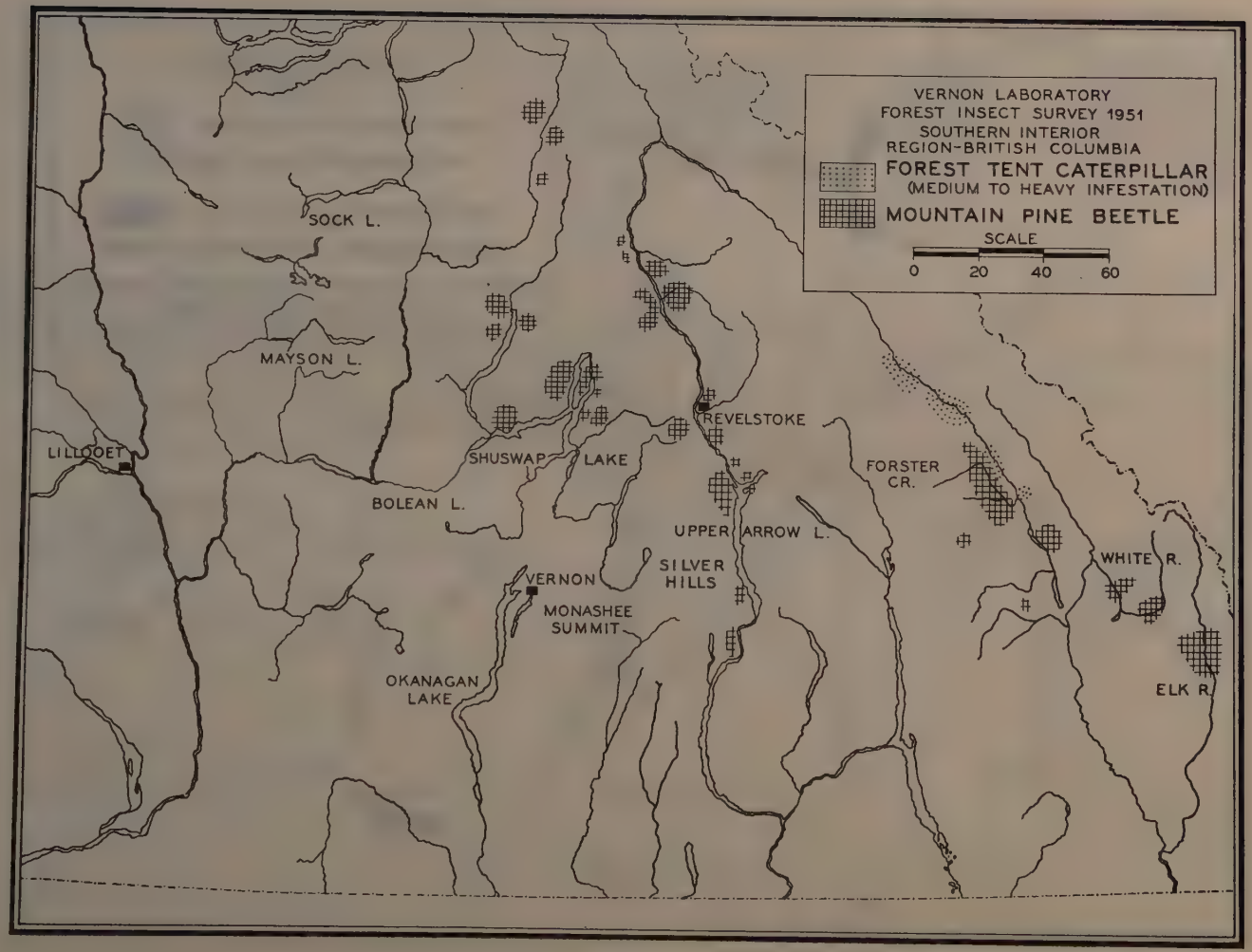
BURNS LAKE
FRANCOIS LAKE
FT. ST. JAMES
SALMON R.
PARSNIP R.
PRINCE GEORGE
FRASER R.
FRASER R.
QUESNEL
VICTORIA AND VERNON LABORATORIES
FOREST INSECT SURVEY 1951
CENTRAL INTERIOR REGION-BRITISH COLUMBIA
SPRUCE BUDWORM INFESTATIONS
HEAVY
MEDIUM & LIGHT
FOREST TENT CATERPILLAR
LIGHT TO HEAVY INFESTATIONS.
SCALE
16 0 16 32


VERNON LABORATORY
FOREST INSECT SURVEY 1951
SOUTHERN INTERIOR
REGION-BRITISH COLUMBIA
FOREST TENT CATERPILLAR
(MEDIUM TO HEAVY INFESTATION)
MOUNTAIN PINE BEETLE
SCALE
0 20 40 60
SOCK L.
MAYSON L.
LILLOOET
BOLEAN L.
SHUSWAP LAKE
REVELSTOKE
FORSTER CR.
UPPER ARROW L.
SILVER HILLS
VERNON
MONASHEE SUMMIT
OKANAGAN LAKE
WHITE R.
ELK R.

MARITIME PROVINCES

M. A. Stillwell

Laboratory of Forest Pathology, Fredericton, N.B.

INTRODUCTION

During 1951, collections of 74 fungi have come in from various localities throughout New Brunswick, Nova Scotia, and Prince Edward Island. The number of collectors was greater than in any previous year, which indicates that the public is becoming more conscious of the importance of disease to its forests. The staff of this Laboratory is being called upon more often to answer questions and give advice concerning protective control measures to be adopted.

Continuation of the research program concerned chiefly with utilization and management of balsam fir, white spruce, red spruce, black spruce, white pine, and birch was carried out in 1951. Population surveys of fungi inhabiting the crowns of white elm and red oak, and a study of the mycorrhizal fungi on yellow birch was initiated during the summer. Reports on these projects will be published when the data have been analysed.

IMPORTANT DISEASES

Decay of Balsam Fir

During the field season of 1951, the survey of decay in living balsam fir was continued in northeastern New Brunswick. An additional 843 trees were examined, bringing the total number of trees examined in the study to 1,776. Of the trees examined, 67 per cent possessed decay, 54 per cent contained butt rot infections, and 40 per cent top rot infection.

The identification of 1951 cultures, to date, continues to indicate that *Corticium galactinum* (Fr.) Burt is the most important butt-rotting fungus and *Stereum sanguinolentum* Alb. & Schw. ex Fr., the most important cause of top rot.

In addition to the 17 fungi previously found associated with decay in balsam fir, three others have appeared in culture. These are *Pholiota adiposa* Fr., *Polyporus schweinitzii* Fr., and a fungus tentatively identified as *Peniophora tenuis* (Pat.) Massee.

Decay of White Spruce

A total of 397 living white spruce have been examined for decay in a study carried out concurrently with the balsam decay studies in northeastern New Brunswick. Eighteen per cent of the trees examined were found to contain decay. Butt rots were more prevalent than top rots; 16 per cent of the trees had butt rot and 6 per cent had top rot. The incidence of decay increased from zero at 40 years to 100 per cent at 200 years.

The following organisms, listed in order or prevalence, have been isolated from butt rots: *Corticium galactinum* (Fr.) Burt, *Polyporus circinatus* var. *dualis* Peck, *Fomes pini* (Thore) Lloyd, *Coniophora puteana* (Schum. ex Fr.) Karst., *Polyporus balsameus* Peck, *Stereum sanguinolentum* Alb. & Schw. ex Fr., *Armillaria mellea* Vahl ex Fr., *Omphalia campanella* Fr., and *Peniophora gigantea* (Fr.) Massee.

Fomes pini and *Stereum sanguinolentum* have been isolated from top decays.

Decay of Red Spruce

A study of decay in living red spruce was initiated in 1950 in the St. Margaret's Bay region of Nova Scotia. Two hundred and sixty trees were examined and only 10 per cent of these contained decay; sap rot occurred in only one tree, the remainder having heart rots. Of the latter, butt rots were more prevalent; 7 per cent of the trees contained butt rot and 3 per cent top rot.

The following organisms have been isolated from butt rots: *Fomes pini* (Thore) Lloyd, *Polyporus circinatus* Fr. var. *dualis*, and *Poria subacida* (Peck) Sacc.; isolated from top rots: *Fomes pini*, *Polyporus circinatus* var. *dualis*, *Stereum chailletii* Pers., and *Stereum sanguinolentum* Alb. & Schw. ex Fr. *Lenzites saepiaria* Wulf. ex. Fr. was isolated from the sap rot.

During the field season of 1951 an additional 395 living red spruce were examined. Only 20 per cent of these contained decay; three had sap rots, the remainder heart rots. Thirteen per cent of the trees had butt rot infection, and 7 per cent contained top rot infections.

Decay of Black Spruce

From an initial sample of 70 living black spruce, 51 from New Brunswick and 19 from Nova Scotia, 16 were found to contain decay. Butt rots were again found to be more prevalent than top rots; 14 trees contained butt rot and only 2 had top rot. To date, the cultures from these rots have not been identified.

White Pine Blister Rust

A combined entomological-pathological project was initiated during the summer of 1951 to ascertain:

(a) optimum site conditions for white pine regeneration.
(b) susceptibility of white pine regeneration to white pine blister rust, *Cronartium ribicola* Fischer, and white pine weevil, *Pissodes strobi* (Peck).

Eighty-eight one-tenth acre plots, 57 in New Brunswick and 31 in Nova Scotia, were established throughout white pine producing regions. All white pine on the plots were closely examined for weevil and rust injury, and the degree of each was recorded. In addition, data were collected on stand history, site factors, stand composition, density of overstory, and regeneration.

Permanent sample plots were re-examined to follow the progress of the rust on nursery stock and to determine the yearly growth rate of cankers.

Decay in Yellow Birch

During 1950, fifty-three yellow birch trees were sectioned at four-foot intervals and examined for defect in Inverness and Victoria Counties in Nova Scotia. In 1951, sixty-five trees in the Green River watershed in New Brunswick, and 177 trees in Guysborough and Inverness Counties in Nova Scotia were examined.

To date, only 36 cultures have been identified, of which 16 are *Fomes fomentarius* (L. ex Fr.) Kickx. Decay characteristics indicate that this will be the most commonly isolated fungus. In most cases trees with a degree of dieback beyond the 3A crown injury class are subject to decay by fungi such as *Fomes fomentarius*, *Polyporus pargamenus* Fr., and *Polyporus betulinus* Bull. ex Fr.

Other fungi associated with decay in the sample trees were as follows: *Armillaria mellea* Vahl ex Fr., *Favolus alveolaris* (DC. ex Fr.) Quél., *Fomes igniarius* (L. ex Fr.) Gill., *Ganoderma applanatum* (Pers.) Pat., *Poria obliqua* (Pers.) Bres., *Phlebia merismoides* Fr., *Pholiota adiposa* Fr., *Polyporus adustus* Willd. ex Fr., and *Ustulina vulgaris* Tul.

Yellow Birch Mycorrhizal Fungi

During the summer of 1951, five hundred and fifty samples were taken from living rootlets of 55 yellow birch trees in Nova Scotia to determine the mycorrhizal fungi involved. From these isolates three fungi have been identified as: *Absidia glauca* Hagem, *Mortierella alpina* Peyronel, and *Mucor ramannianus* A. Moeller. In addition, 15 unknown fungi were isolated.

Diseases of White Elm

In 1951 a survey was initiated to determine what fungi inhabit twigs of white elm, *Ulmus americana* L., in New Brunswick and Nova Scotia, and at the same time to discover if the Dutch elm fungus, *Ceratostomella ulmi* (Schwarz) Buisman, has been introduced. Samples consisting of dead and dying twigs and small branches, were taken from the upper crowns of 88 trees, 51 in New Brunswick, 37 in Nova Scotia. Four isolations were made from the twigs of each tree sampled; 324 cultures were obtained but none have been identified.

The frequency of the more commonly occurring fruiting bodies was as follows:

Peniophora sp.	48 trees
Polyporus conchifer (Schw.) Fr.	9 trees
Tubercularia sp.	6 trees

Diseases of Red Oak

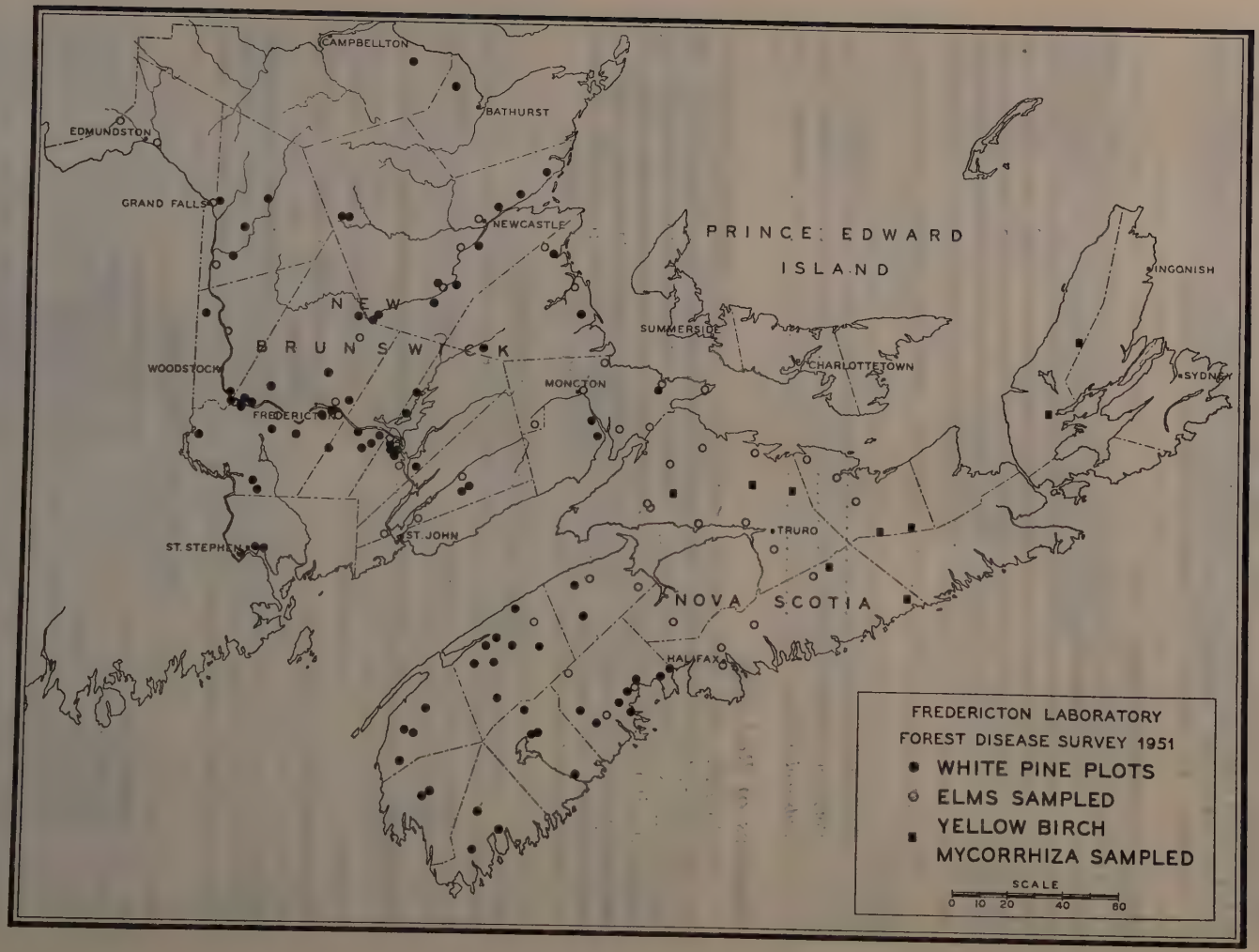
In August, 1951 five samples were taken from the dying twigs of each of 16 red oaks, *Quercus borealis* Michx. f. in southern Nova Scotia where this species shows a dieback condition. This survey was carried out in an effort to determine if the oak wilt fungus, *Chalara quercina* Henry, was responsible, but no fungi could be isolated. In Halifax one group of six oak trees was discovered to be wilting very rapidly. Numerous isolations did not reveal the presence of *Chalara quercina*, but four fungi, as yet unidentified, were isolated.

OTHER NOTEWORTHY DISEASES

Host	Locality	Casual Organism	Remarks
Picea mariana (Mill.) B.S.P.	Cape Breton Island	*Arceuthobium pusillum* Peck.	Very common
Picea spp.	N.S. and Southern N.B.	*Arceuthobium pusillum* Peck.	Frequent
Pinus banksiana Lamb.	Southern N.B.	*Hypodermella ampla* (Davis) Dearn.	Quite common
Salix sp.	Eastern N.S.	*Physalospora miyabeana* Fuk.	Common but host rare

LIST OF CO-OPERATORS

Balch, R. E.
Barter, W.
Bickle, A.
Brown, N. R.
Cope, Charles
Cuming, F. G.
Forbes, R. S.
Grew, Charles R.
Hawboldt, L. S.
Horne, Miss Marion
Howie, E. L.
Leim, A. H.
Loughery, Miss B. P.
MacMillan, Angus
McAulay, F. D.
Murray, R. R.
O'Neill, J. M.
Profitt, W. M.
Reeks, W. A.
Steeves, Mrs. K. W.
Swanburg, G.
Thomas, D. A.
Thompson, G.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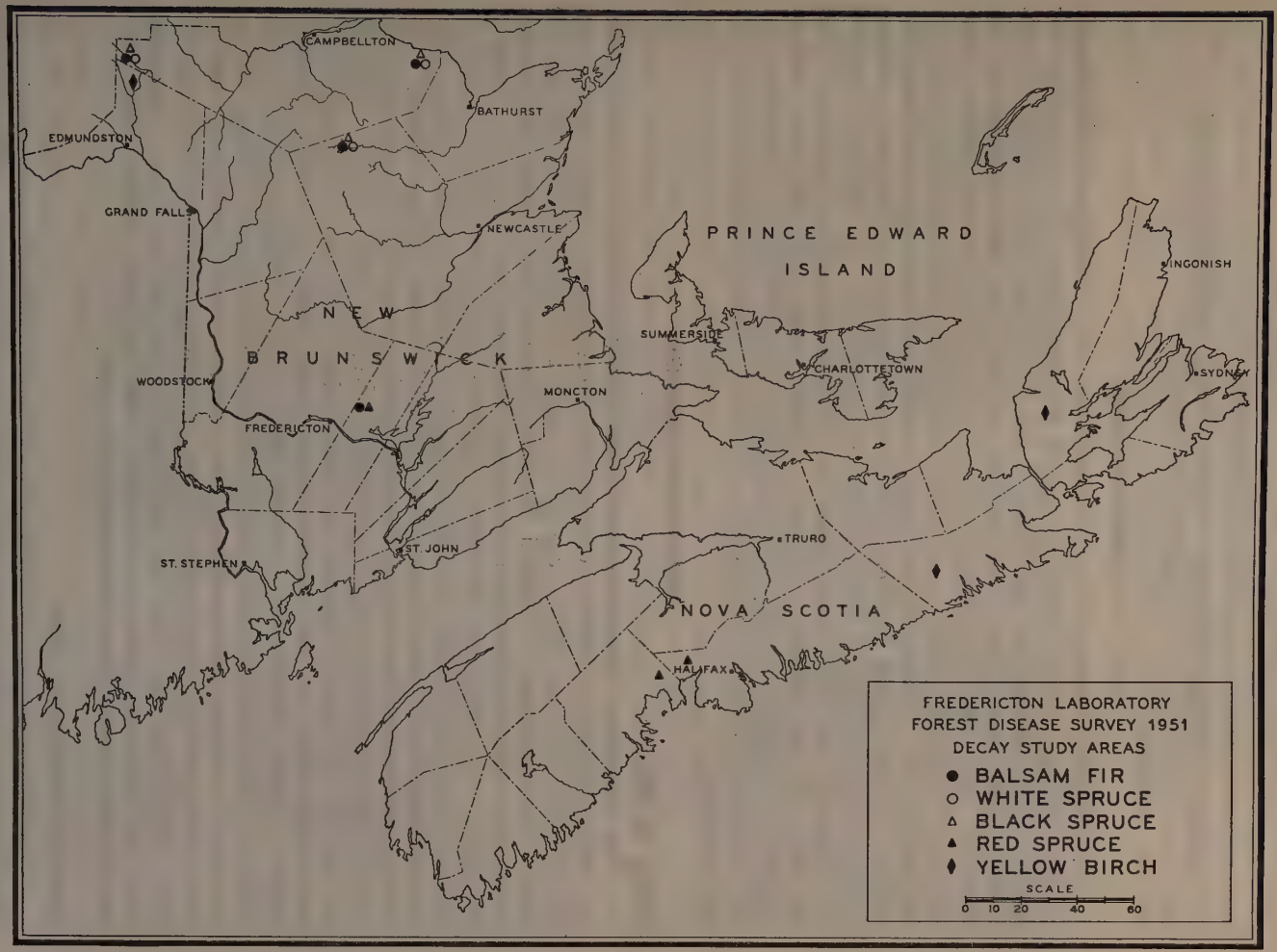
BATHURST
EDMUNDSTON
GRAND FALLS
NEWCASTLE
PRINCE EDWARD
ISLAND
INGONISH
N E W
B R U N S W I C K
SUMMERSIDE
CHARLOTTETOWN
SYDNEY
WOODSTOCK
MONCTON
FREDERICTON
TRURO
ST. STEPHEN
ST. JOHN
NOVA SCOTIA
HALIFAX
FREDERICTON LABORATORY
FOREST DISEASE SURVEY 1951
WHITE PINE PLOTS
ELMS SAMPLED
YELLOW BIRCH
MYCORRHIZA SAMPLED
SCALE
0 10 20 40 60


CAMPBELLTON
BATHURST
EDMUNDSTON
GRAND FALLS
NEWCASTLE
PRINCE EDWARD
ISLAND
INGONISH
N E W
B R U N S W I C K
SUMMERSIDE
CHARLOTTETOWN
SYDNEY
WOODSTOCK
MONCTON
FREDERICTON
TRURO
ST. JOHN
ST. STEPHEN
NOVA SCOTIA
HALIFAX
FREDERICTON LABORATORY
FOREST DISEASE SURVEY 1951
DECAY STUDY AREAS
BALSAM FIR
WHITE SPRUCE
BLACK SPRUCE
RED SPRUCE
YELLOW BIRCH
SCALE
0 10 20 40 60

PROVINCE OF QUEBEC

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INTRODUCTION

No systematic survey of tree diseases has been carried on during recent years in Quebec, owing mainly to lack of technical staff. In the past a fair picture of the pathological conditions of the forest was obtained from records collected each year during investigations and visits in various regions of this Province. But, with the exception of few well-defined diseases, such as birch die-back, Dutch elm disease, and white-pine blister rust, no intensive survey was carried out. Although it has been possible by this means to gather information on quite a large number of diseases throughout the Province, nothing comparable to the Forest Insect Survey was organized. It should be pointed out, however, that only well-trained men can usually collect useful material and data on tree diseases. Without previous notice and with very limited resources of information and no co-operation, the following brief statement on the prevalence of forest tree diseases in the Province of Quebec during 1951 was prepared.

IMPORTANT DISEASES

Dying of Birch

This widespread disease, responsible for extensive destruction of both yellow and white birches in Eastern Canada and Northeastern United States, can still be traced this year within most of the settled territory of this Province and close to cut-over areas. All in all, however, the condition of these two species is far better than two years ago and signs of recovery can be found in most of the regions. In Rimouski and Temiscouata Counties and also in Gaspé Peninsula, where the heaviest damage was noticed during the last fifteen years, dead and severely injured trees are less obvious in densely wooded lands. This is owing to the breaking of dead tops on one hand and to the growing of the crown of partially affected trees and healthy ones on the other hand. Although the scars of this severe outbreak, noticeable since 1936 but particularly spectacular since 1941, can still be found almost everywhere on the South Shore of the St. Lawrence River and the North Shore from the Saguenay River to the Valley of the Gatineau, no important progress was detected during the last two years. Such an improvement in the health of these species can easily be related to the weather conditions of the two last seasons, during which the amount of the rainfall was higher and dry spells less frequent and extended. Excepting these new facts concerning the relation of this trouble to weather conditions, nothing new has been found concerning the cause.

Dying of Hardwood Trees

The particular type of decadence so extensive in birch was also noticed on other hardwood species during the last 25 years in Quebec. Ash and maples were quite severely affected in some areas, but less obviously than birch. In 1948 and 1949 similar injury could be traced in stands and in isolated trees in

most of the hardwood forest area of this Province. Maples, beech, elm, red oak, and popular, with partially defoliated crowns could be found, particularly during the summer of 1949. A small scale survey was undertaken in 1950 to estimate the severity of this trouble around the City of Quebec. Repeated in the same stands in 1951, this survey has shown no increase, rather some improvement of the health of the trees under observation. Similar recovery in sugar maple stands was also evident in other areas visited each summer during the last few years. This trend appears to add weight to the hypothesis put forward on the physical or climateric nature of the birch dying.

Dutch Elm Disease

In 1951 no systematic survey was conducted in the entire elm range of this Province to find trees infected by *Ceratostomella ulmi*. In a few cities of the southern part of the Province, inspection was carried out by federal employees. From less accurate observations made during travelling across the infected area, it may be stated that the intensity of the infection is apparently decreasing this year. Numerous symptomatic trees can still be found everywhere from Quebec to Montreal on both sides of the St. Lawrence River. And if, in the center of the infected area, around Sorel and Berthierville, fewer diseased trees can be found in the already reduced elm population, the number of those showing the characteristic wilting is large enough in most other districts. In only one property at Cap-de-la-Madeleine, near Three Rivers, more than 25 trees were found infected out of a total population of 350 elms. All in all, the Dutch elm disease outbreak in Quebec, where the causal fungus is firmly established in most of the elm range, should still be considered as very severe. It is felt, however, that the proportion of the elm population lost over a period of years is not so high as anticipated a few years ago.

White-Pine Blister Rust

No close estimate of the prevalence of this epidemic disease throughout the range of the white pine in Quebec has been attempted. In the past, cases of infection were noticed and reported from almost every area where this tree grows. But, except in plantations, little spectacular damage was noticed in natural stands. However, the cumulative effect of the gradual killing of white pine is fairly important, and each year a great number of valuable trees are killed by girdling. This is particularly noticeable in the farm woodlots, where this species provides in some areas the most important lumber. In 1951 cankered pines were occasionally found in various parts of Quebec, as during previous years. In order to gain a better knowledge of the significance of this exotic parasite to the forests of this Province, a systematic survey should be undertaken in the near future.

OTHER NOTEWORTHY DISEASES

Snow Blight (caused by *Phacidium balsameae*).

This year the snow blight has caused severe damage in two Quebec forest nurseries. At Proulx, however, the infection is controlled by spraying each fall with limesulphur.

Damping Off

This trouble was noticeable in red pine seedlings this year at the Proulx Nursery, but was almost absent in spruce seedlings. At Berthierville very light damage by the same disease was observed.

Ink-Spot Disease (caused by *Sclerotinia bifrons*).

For several years in Quebec the ink-spot disease was not very noticeable in most of the territory. During last summer, however, the number of blighted leaves was slightly greater than usual in several areas of the Province.

Willow Blight (caused by *Fusicladium saliciperdum*).

Several mild cases of willow blight were noticed around the City of Quebec and at other places in the northeastern part of the Province.

Frost Injury

In several areas of this Province, but particularly in Rimouski County, frost injury was observed on white spruce and red oak. Around the City of Quebec a small number of sugar maples showed mild cases of bud freezing injury.

PROVINCE OF ONTARIO

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INTRODUCTION

The increasing demand for information concerning the distribution and intensity of forest tree diseases in Ontario contributed in part to the establishment of the Forest Disease Survey in 1951. In this initial period an important phase was the development of methods for processing, identifying, and recording material submitted in the Survey. It was natural also that disease samples from those areas in which field parties from the Toronto Laboratory were operating should form a large proportion of the collections. At the outset co-operators were requested to submit specimens from living trees only. This expedient, although it limited the volume of material, avoided the submission of large numbers of widely distributed saprophytes. The expansion of the Survey is likely to arouse public interest in fungous diseases of trees, and may be expected to result in a progressive increase in the number of participating co-operators.

The present report has been designed, primarily, to give an assessment of the current status of forest diseases in Ontario. Subsequent reports may be expected to record any changes that develop from year to year. A total of 8,062 collections was made; this included 2,070 fungous samples, and 5,992 samples of diseased material from which causal organisms were isolated.

The numbers of collections of fungous samples from the principal tree species were as follows:

Coniferous Hosts	Collections	Deciduous Hosts	Collections
White pine	132	Poplar	443
Red pine	84	White birch	396
Jack pine	11	Yellow birch	113
Balsam fir	123	Sugar maple	176
White spruce	44	Red maple	33
Black spruce	40	Red oak	34
Hemlock	9	Ironwood	19
White cedar	34	Beech	15
Larch	6	Basswood	41
Others	7	Black cherry	38
		Others	233
Total	490	Total	1,541

Miscellaneous Hosts 36

Total—2,070

The numbers of collections from which cultures of the causal organisms were made were as follows:

Coniferous Hosts	Collections	Deciduous Hosts	Collections
Red pine	4,547	White birch	818
Jack pine	223	Poplar	201
White pine	49		
Balsam fir	154		
Total	4,973	Total	1,019

Total—5,992

Grand Total—8,062

IMPORTANT DISEASES

Pine Diseases

White-Pine Blister Rust

Surveys assessing blister rust conditions have been conducted in a number of widely separated areas. In the Petawawa area, examination of 6,787 white pine trees located in 44 plots revealed that 5·3 per cent of these trees were fatally infected with *C. ribicola*. Few white pine seedlings on these plots showed signs of infection.

In the Dorset and Mattawa areas surveys have indicated that 15 to 20 per cent of the white pine stands were infected with this disease. A study of the influence of *C. ribicola* on reproduction and young growth of white pine was initiated in the Dorset area in 1951. Concurrently with this study a survey of the *Ribes* population has been undertaken in the Dorset and Madawaska regions. Three species of *Ribes* were encountered, viz., *R. cynosbati* L., *R. glandulosum* Grauer, and *R. triste* Pall., the last named species having been confined to one area of a few acres. The average number of *Ribes* plants per acre was 43, representing an average of 142 feet of living stem. Of the total number of feet of living stem, *R. glandulosum* accounted for approximately 76 per cent, *R. cynosbati* for 17 per cent, and *R. triste* for the remainder.

It was noted in sample plots in the area adjacent to Sudbury that infections of white pine trees with *C. ribicola* showed a lower incidence than in some other areas of Ontario, although infection of occasional *Ribes* species was observed. Since *C. ribicola* requires an incubation period of at least three years from infection to appearance of disease symptoms, it is possible that the premature shedding of two-year and older needles reported in areas subject to fume injury may be responsible for the relative resistance of white pine in this area.

A survey was made of 3,060 young white pine trees in southern Ontario in the county forests of Durham, Vivian, Northumberland, Grey, Dufferin, and Uxbridge. Approximately 4·5 per cent of these trees showed symptoms of *C. ribicola* attacks, and slightly more than half of the infected trees had died. The incidence of white pine blister rust in southern Ontario, based on the results of the survey carried out this year, shows very little change from that revealed by surveys carried out in 1949 and 1950.

Deterioration of Fire-killed Pine

Observations on the pathological condition of red, white, and jack pine trees, which had been killed by fire in the Mississagi region of Ontario in 1948, revealed that in three years practically all of the trees examined in 1951 exhibited symptoms of both sap stain and either incipient or advanced sap rot. The fungal organisms involved in this deterioration of fire-killed pine belonged to the Class Basidiomycetes causing sap rots, and to the Fungi Imperfecti causing sap stains.

The most frequently encountered organisms associated with sap rot in these trees were *Polyporus abietinus* Dicks. ex Fr., *Poria subacida* (Peck) Sacc., and *Polyporus circinatus* var. *dualis* Peck, associated with white stringy sap rots; and *Fomes pinicola* (Sw.) Cooke, *Peniophora gigantea* (Fr.).) Massee, *Lenzites saepiaria* Wulf. ex Fr., and *Poria monticola* Murr. associated with brown cubical sap rots. The most prevalent of these were *F. pinicola*, *P. abietinus*, and *P. gigantea*, in that order, the first two being mostly isolated from jack pine and the latter from red pine.

The Fungi Imperfecti responsible for the three sap stains occurring in these trees, viz., blue stain, brown stain, and orange ring stain, have not yet been identified. In 1951 blue stain was observed in 82, 95, and 72 per cent, and brown stain in 82, 80, and 51 per cent of the white pine, red pine, and jack pine

respectively. Whereas, in the 1950 season orange ring stain, occurring at the division of the heartwood and sapwood, was recorded in approximately half of the jack pine examined, in the past season this stain was observed in only 28 per cent of the jack pine sectioned. This orange ring was never observed in white or red pine.

Needle Blight of White Pine

Since no causal organism has thus far been isolated from needle-blighted white pine trees, it is inferred, generally, that needle blight is a physiological disorder.

White pine needle blight was reported throughout the range of white pine in Ontario during the summer of 1951, with symptoms appearing rather suddenly in mid-July. Records have been maintained for a number of years on the needle-blight condition of white pine in the Chalk River, Mattawa, Temagami, Mississagi, and Muskoka areas.

In the Chalk River area during 1951 the first symptoms of the disease were noted on July 19. Within the following week practically all trees involved in this year's blight attack exhibited the disease in various degrees of severity. It was noted that of 6,430 white pine trees, 247, or 3·8 per cent, were attacked. Of these, 138 trees had not shown symptoms in the previous year, and 75 trees that had shown symptoms of needle blight in 1950 showed no disease symptoms in 1951.

In the Mattawa area 3·4 per cent of 1,469 white pine trees examined exhibited needle blight symptoms. It was observed that these symptoms were exhibited on all or part of the crown. In some cases needles on adventitious branches on the stems of white pine trees were attacked. Clusters of dwarfed, chlorotic needles were present on trees known to contract the disease during successive years.

Occasional records of the disease were received from the Muskoka, Temagami, Mississagi, and North Shore regions.

Damping-off of Red Pine Seedlings

Damping-off of seedlings in forest nurseries of Ontario has resulted in extensive losses of valuable stock in seasons favourable to the development of the causal organisms. This disease is caused by a number of fungi which are classified, mainly, in two major groups: Phycomyetes and Fungi Imperfecti. These soil-inhabiting fungi may live saprophytically on organic matter until with optimum environmental conditions they are capable of infecting and destroying young seedlings. Although damping-off fungi may be present in all nurseries the relative proportions of the various species varies considerably from one locality to another.

Some 75,000 seedlings of red pine were under observation in the seed-beds at the Orono Nursery of the Ontario Forestry Branch during 1951. These seedlings were growing under a number of treatments using various combinations of fertilizers and mulches. During the peak growing season approximately 30 per cent of the seedlings succumbed from attack by damping-off fungi. The fungi causing mortality in the nursery beds were isolated from approximately 4,500 samples and were recorded as follows:

Fusarium scirpi Lamb. & Fautr. var. *acuminatum* (Ellis & Everh.) Wollenw.; *Rhizoctonia solani* Kühn; and a mixture of *Fusarium oxysporium* Schlecht. and *F. solani* (Mart.) Appel & Wollenw. Of these organisms the most frequent in occurrence were *F. scirpi* var. *acuminatum* and *R. solani*. The *R. solani-F. oxysporium* mixture appeared late in the season.

It is evident that under the conditions investigated, on the average, seedling beds with a density of about 90 seedlings per square foot will be free of damping-off and that a little more than one-half of any seedlings in excess of this density will succumb. Treatments with peat on the surface of the seed-beds significantly reduced both germination and mortality.

Condition of White Pine in the Sudbury District

An appraisal of the condition of white pine trees in the Sudbury region is being carried out in an attempt to determine the effects that the smelter fumes emitted in this area have on these trees. A total of 6,735 white pine trees were under observation in 1951; 45·4 per cent of these were located in plots judged to be outside the limit of atmospheric contamination.

Discoloration of current year's foliage and discoloration of 1-year-old needles were recorded respectively on 11·9 per cent and 60·5 per cent of the trees in plots adjacent to the source of the fumes, on 3·7 per cent and 16·5 per cent of the trees in plots in the fume area further removed from the source of the fumes, and on 3·4 per cent and 9·2 per cent of the trees in plots in the non-fume area. The discoloured 1-year-old foliage is generally reddish-brown at apex and yellowish-green at the base, whereas the discoloured current year's foliage is bright orange-red at the apex and green at the base. The discoloration of current year's needles corresponds with the symptoms of acute fume injury and of needle-blight, between which no positive distinction can be so far made.

The mortality rate of trees in the fume area was 5·6 per cent, compared with 3·0 per cent in the area presumed free from fumes. Of the white pine trees in the fume area that died in a one-year period, 37 per cent had possessed, in the preceding season, discoloured 1-year-old foliage accompanied by green current year's foliage; whereas none of the white pines in the non-fume area so affected had succumbed. It was observed that, on sample plots, 2·3 per cent of the reproduction in the fume area had died compared to 1·1 per cent in the non-fume area, and that there were twice as many white pine seedlings per acre in the latter area as in the former.

It is hardly possible at present to closely define the limits of the areas adversely affected by fumes emanating from smelters in the Sudbury area because of the similarity that exists between symptoms of needle blight and fume damage.

Balsam Fir Diseases

Deterioration of Insect-killed Balsam Fir

Observations have disclosed that *Polyporus abietinus* Dicks. ex Fr. is by far the most important fungal organism concerned with the pathological deterioration of balsam fir trees killed by the spruce budworm in the Lake Nipigon region of Ontario.

On a volume basis, 92·4 per cent of the advanced deterioration present in the trees sectioned was caused by this fungus, which produces a white stringy sap rot. This decay was found only in trees that had been dead for a period longer than one year.

Practically all trees examined that had been dead for less than one year possessed a yellowish discoloration in the sapwood. Cultures obtained from this stained wood revealed that it was caused by *Stereum chailletii* Pers. After trees had been dead over a period of more than one year, this stain was as a rule replaced by the white stringy sap rot caused by *P. abietinus*.

The remaining 7·6 per cent of the volume of advanced deterioration was found to be caused by two organisms resulting in brown cubical sap rots, *Fomes pinicola* and *Coniophora puteana* (Schum. ex Fr.) Karst. These brown sap rots generally occurred as patches in the white stringy sap rot, and were observed only in trees that had been dead for periods longer than one year.

Poplar Diseases

Decay in Living Trembling Aspen

Sixteen fungal organisms were isolated from heartwood decays of 1,010 trembling aspen (*Populus tremuloides* Michx.) trees felled and sectioned in the Upper Pic region of northern Ontario in 1950. By far the most important of these were *Fomes igniarius* var. *populinus* (Neuman) Campbell and *Radulum casearium* (Morgan) Lloyd, which were responsible for practically all the trunk rot and for 86·3 per cent of the total volume of decayed wood in these trees. It was observed that when a series of *F. igniarius* fruiting bodies, or a single conk of more than six inches in width, occurred on a tree extensive decay caused by this organism was, as a rule, present in that tree. This is believed to be the first record of *R. casearium* as the cause of considerable decay in living trembling aspen trees.

Of the ten fungal organisms isolated from butt rots of these trees, the predominant ones were *Pholiota spectabilis* Fr., *Armillaria mellea* Vahl ex Fr., *Pholiota adiposa* Fr., and *Collybia velutipes* Curt. ex Fr., responsible for 1·9, 1·6, 0·8, and 0·4 per cent, respectively, of the total volume of decayed wood in these trees.

A blue stain of unknown fungal origin was frequently encountered in both sound and decayed heartwood of mature and overmature poplar trees.

Birch Diseases

Deterioration of Birch

To establish the role played by fungous organisms in the deterioration of birch in Ontario, detailed records were obtained for 3,000 yellow birch (*Betula lutea* Michx. f.) and 325 white birch (*Betula papyrifera* Marsh.) in 35 one-acre plots in representative stands from the eastern boundary of the Province to the western limits of birch distribution during the field seasons of 1949 and 1950. At the same time 237 yellow birch and 201 white birch in that area were felled, and samples of fruiting bodies and of disease lesions and abnormalities, especially those in living tissue, were collected; the average number of samples per tree was 19. The samples ranged in size from small twigs with dead or dying foliage to larger branches with cankers.

During the field season of 1951 the study was extended to include a more adequate sampling of white birch. Detailed records were secured on 874 white birch in six plots located in the districts of Nipissing, Parry Sound, and Muskoka, and in the counties of Haliburton, and Lennox and Addington. There were 818 samples taken from 35 trees which were felled near the borders of the plots. The types of samples collected were similar to those of the previous two years, but also included specimens of the main stem of sample trees.

All birch samples collected over the three-year period were sent to the Division of Botany and Plant Pathology, Ottawa, for culturing. Information on the past season's cultural work is not yet available.

The mycological flora from samples of yellow birch in 1950 was similar to that isolated in 1949. In each year the three most important fungi isolated were *Phomopsis* sp., *Coniothyrium* sp., and *Melanconis nigrospora* (Peck) Wehm. *Phomopsis* sp. was isolated from samples taken from 94 per cent of the trees analysed in 1949, and from samples from each tree analysed and from 39 per cent of the total number of samples cultured in 1950. *Coniothyrium* sp .was isolated from samples taken from 90 per cent of the trees analysed in 1949 and from 27 per cent of the total number of samples cultured in 1950, after occurring in culture along with *Phomopsis* sp. Although *M. nigrospora* was isolated only from 72 per cent of the trees analysed in 1949, in 1950 it was found fruiting on dead twigs from practically all trees sampled, but was isolated from disease

lesions in living tissue from only 2 per cent of the samples cultured. These three fungi have been isolated from yellow birch in sufficient frequency to be considered of primary importance in this problem.

The mycological flora in white birch, as revealed by the information to hand, was quite different to that found in yellow birch. From the cultures from samples of the white birch analysed, the fungi most frequently isolated were *Melanconium bicolor* Nees. ex Fr. and *Sphaeropsis* sp., and from the fruit bodies, the fungi occurring most commonly were *Cryptosporella* sp. and *Steganosporium* sp.

Elm Diseases

Survey of Dutch Elm Disease

The information, on which this report is based, was obtained as a result of co-operative project undertaken by the Dominion Department of Agriculture (Divisions of Plant Protection, Botany and Plant Pathology, and Forest Biology) and the Ontario Department of Agriculture.

One hundred and ninety positive records of *Ceratostomella ulmi* (Schwarz) Buisman, the causal fungus of this disease, were obtained in southern Ontario in 1951. Of these, 88·4 per cent were in Essex County; 6·8 per cent in Carleton County; and the remainder in the counties of Kent, Peel, Lennox and Addington, York, Prince Edward, and Leeds. *C. ulmi* has not been found in the counties of Prescott, Glengarry, Frontenac, and Welland during the current season, although it was reported on one tree in each of these counties in 1950. The disease had not previously been reported from Lennox and Addington, York, or Kent counties.

In the accompanying map, the known distribution of *C. ulmi* in Ontario in November, 1951, is outlined.

OTHER NOTEWORTHY DISEASES

Host	Locality	Causal Organism	Remarks
Pine	Mississagi region	*Polyporus schweinitzii* Fr.	Heart rot in trees later killed by fire.
"	" "	*Corticium galactinum* (Fr.) Burt.	
"	" "	*Corticium fuscostratum* Burt	
"	" "	*Fomes annosus* (Fr.) Cooke	
Jack pine	Chapleau	*Fomes pini* (Thore) Lloyd	Heart rot in trunk.
"	Kindiogami Lake	"	
"	Black Sturgeon Lake	"	
"	Algonquin Park	*Cronartium quercuum* (Berk.) Miyabe	Globose rust galls on main stem.
"	Sudbury	Atmospheric pollution	Associated with browning and death of needles.
Red pine	Pine Lake, Dorset	*Polyporus abietinus* Dicks. ex. Fr.	White pocket rot in sapwood.
"	P.F.E.S., Chalk River	" " "	
"	Kindiogami Lake	*Fomes pini* (Thore) Lloyd	Heart rot in trees later killed by fire.
"	Harrison Twp., Parry Sound	"	Heart rot in trunk.
"	Scarboro Twp., York Co.	*Coleosporium solidaginis* (Schw.) Thüm.	Rust pustules on needles resulting in defoliation.
"	Pine Lake, Dorset		
"	Baysville, Muskoka		
"	Kindiogami Lake	*Stereum sanguinolentum* Alb. and Schw. ex Fr.	Decay in heartwood of trees later killed by fire.
"	Wallbridge Twp., Parry Sound	*Fomes pinicola* (Sw.) Cooke	Brown crumbly rot in sapwood and heartwood.
"	Manitoulin Island	*Peniophora gigantea* (Fr.) Massee	Sap rot of branches and stems of saplings.
"	Harrison Twp., Parry Sound	" "	
"	P.F.E.S., Chalk River	" "	
"	Sudbury	Atmospheric pollution	Associated with browning and death of needles.

OTHER NOTEWORTHY DISEASES—Continued

Host	Locality	Causal Organism	Remarks
White pine	Marion Lake, Temagami	*Polyporus abietinus* Dicks. ex Fr.	White pocket rot in sapwood.
"	Pine Lake, Dorset	" "	
"	P.F.E.S., Chalk River	" "	
"	Chapleau	*Fomes pini* (Thore) Lloyd	Heart rot in trees later killed by fire.
"	Kindiogami Lake	"	
"	Goward, Temagami	"	Heart-rotting trees.
"	Pine Lake, Dorset	"	
"	P.F.E.S., Chalk River	"	
"	Marion Lake, Temagami	*Peniophora gigantea* (Fr.) Massee	Sap-rotting branches and stems.
"	Harrison Twp., Parry Sound	" "	
"	Algonquin Park, Nipissing	" "	
"	P.F.E.S., Chalk River	" "	
"	Marion Lake, Temagami	*Poria subacida* (Peck) Sacc.	Root and butt rot of the heartwood.
"	P.F.E.S., Chalk River	*Polyporus schweinitzii* Fr.	Brown cubical rot of the heartwood.
"	Pine Lake, Dorset	*Armillaria mellea* Vahl ex Fr.	Root and butt rot of heartwood and sapwood.
"	P.F.E.S., Chalk River	*Corticium galactinum* (Fr.) Burt.	Root-rotting young trees.
"	Algonquin Park, Nipissing	*Stereum sanguinolentum* Alb. and Schw. ex Fr.	Heart rot in stem.
Balsam fir	Manitoulin Island	*Polyporus abietinus* Dicks. ex Fr.	White pocket rot in sapwood.
"	Marion Lake, Temagami	" "	
"	Harrison Twp., Parry Sound	" "	
"	Ridout Twp., Muskoka	" "	
"	Pine Lake, Dorset	" "	
"	Denbigh	" "	
"	P.F.E.S., Chalk River	" "	
"	Manitoulin Island	*Fomes pinicola* (Sw.) Cooke	Brown crumbly rot in sapwood and heartwood
"	Marion Lake, Temagami	" "	
"	Pine Lake, Dorset	" "	
"	P.F.E.S., Chalk River	" "	
"	Black Sturgeon Lake	*Stereum sanguinolentum* Alb. and Schw. ex Fr.	Brown friable decay in heartwood.
"	Denbigh		
"	Black Sturgeon Lake	*Corticium galactinum* (Fr.) Burt.	Rot isolated from insect-killed trees.
"	Black Sturgeon Lake	*Polyporus balsameus* Peck	Brown cubical rot in butt of trees.
"	Rideout Twp., Muskoka	" "	
"	Black Sturgeon Lake	*Armillaria mellea* Vahl ex Fr.	Root and butt rot of heartwood and sapwood.
"	" "	*Dasyscypha resinaria* (Cooke and Phil.) Rehm.	Canker and dieback of stems and branches.
"	Manitoulin Island	" "	
"	Thessalon	" "	
"	Pine Lake, Dorset	" "	
"	Cardiff Twp., Haliburton	" "	
"	Sudbury	Atmospheric pollution	Associated with browning and death of needles.
White spruce	Pine Lake, Dorset	*Polyporus abietinus* Dicks .ex Fr.	White pocket rot in sapwood.
"	Manitoulin Island	*Fomes pinicola* (Sw.) Cooke	Brown crumbly rot in heartwood and sapwood.
"	Pine Lake, Dorset	" "	
"	Pine Lake, Dorset	*Fomes pini* (Thore) Lloyd	Heart rot in trunk.
"	Manitoulin Island	*Peniophora gigantea* (Fr.) Massee	Saprot in branches and stem.
"	Black Sturgeon Lake	*Stereum sanguinolentum* Alb. and Schw. ex. Fr.	Decay in heartwood.
"	Manitoulin Island	" "	
"	Cockburn Island	" "	
Spruce	Sudbury	Atmospheric pollution	Associated with browning and death of needles.
Black Spruce	Marion Lake, Temagami	*Peniophora gigantea* (Fr). Massee	Saprot in branches and stem.

OTHER NOTEWORTHY DISEASES—Continued

Host	Locality	Causal Organism	Remarks
Black Spruce	Ellis Twp., Sudbury	*Chrysomyxa cassandrae* (Peck and Cooke) Tranz.	Rust pustules on needles resulting in defoliation.
"	Hudson's Twp., Kenora	" "	
"	Forest Div. 27, Sioux Lookout	" "	
"	Forest Div. 27, Sioux Lookout	*Chrysomyxa ledi* (Alb. and Schw.) de Bary	Rust pustules on needles resulting in defoliation.
"	Marion Lake, Temagami	*Fomes pinicola* (Sw.) Cooke	Brown crumbly rot in sapwood and heartwood.
"	Pine Lake, Dorset	" "	
"	Cockburn Island	*Polyporus abietinus* Dicks. ex Fr.	White pocket rot in sapwood.
"	Marion Lake, Temagami	" "	
"	Pine Lake, Dorset	" "	
White Cedar	Manitoulin Island	*Peniophora gigantea* (Fr.) Massee	Saprot in branches and stem.
"	Marion Lake, Temagami	" "	
"	Sudbury	Atmospheric pollution	Associated with browning and death of leaves.
Yellow birch	From eastern limits of Ontario to the Western limits of yellow birch (at Lake Superior)	*Libertella faveacea* Trav	These 7 fungi were isolated repeatedly but not consistently from twig samples of lesions and abnormal growths.
"	" "	*Libertella betulina* Dean	
"	" "	*Gelatinosporium fulvum* Peck	
"	" "	*Gelatinosporium magnum* Ellis	
"	" "	*Fusarium scirpi* (Lamb. and Fautr.) var. *acuminatum* (Ellis and Everh.) Wollenw.	Collected throughout the locality indicated.
"	" "	*Cytosporiopsis* sp.	
"	" "	*Cytospora* sp.	
"	Harrison Twp. Parry Sound	*Ganoderma applanatum* (Pers.) Pat.	White mottled rot in heartwood and sapwood.
"	Cardiff Twp., Haliburton	" "	
"	Pine Lake, Dorset	*Fomes igniarius* (L. ex. Fr.) Gill.	White heart rot in trunk.
White birch	Black Sturgeon Lake	*Fomes igniarius* (L. ex. Fr.) Gill.	White heart rot in trunk.
"	Marion Lake, Temagami	" "	
"	Wallbridge Twp., Parry Sound	" "	
"	Pine Lake, Dorset	" "	
"	Cardiff Twp., Haliburton	" "	
"	Denbigh	" "	
"	Manitoulin Island	*Fomes pinicola* (Sw.) Cooke	Brown cubical rot in heartwood and sapwood.
"	Marion Lake, Temagami	" "	
"	Pine Lake, Dorset	" "	
"	Cardiff Twp. Haliburton	*Ganoderma applanatum* (Pers.) Pat.	White mottled rot in heartwood and sapwood.
"	P.F.E.S., Chalk River	" "	
"	Black Sturgeon Lake	" "	
"	Sudbury	Atmospheric pollution	Associated with browning and death of leaves.
Poplar	Marion Lake, Temagami	*Fomes igniarius* (L. ex Fr.) Gill.	White heart rot in trunk.
"	Wallbridge Twp., Parry Sound	" "	
"	Cardiff Twp., Haliburton	" "	
"	Black Sturgeon Lake	*Fomes pinicola* (Sw.) Cooke	Brown cubical rot in heartwood and sapwood.
"	Wallbridge Twp., Parry Sound	" "	
"	Manitoulin Island	*Ganoderma applanatum* (Pers.) Pat.	White mottled rot in heartwood and sapwood.
"	Cockburn Island	" "	
"	Wallbridge Twp., Parry Sound	" "	
"	Pine Lake, Dorset	" "	
"	Pine Lake, Dorset	*Armillaria mellea* Vahl ex Fr.	Root and butt rot in heartwood and sapwood.
"	Manitoulin Island	*Hypoxylon pruinatum* (Klotsch) Cooke	Canker and dieback of stem.
"	Pine Lake, Dorset	" "	
"	Denbigh	" "	
"	Temagami area	Physiological condition	Associated with browning and death of leaves.

OTHER NOTEWORTHY DISEASES—Concluded

Host	Locality	Causal Organism	Remarks
Sugar Maple.....	Ridout Twp., Muskoka	*Armillaria mellea* (Vahl ex. Fr.)..	Root and butt rot in heartwood and sapwood.
" "	Pine Lake, Dorset.....	" " ...	
" "	Pine Lake, Dorset.....	*Fomes igniarius* (L. ex. Fr.) Gill...	Canker of stem.
" "	Harrison Twp., Parry Sound	" " ...	
" "	Ridout Twp., Muskoka	*Fomes pinicola* (Sw.) Cooke.....	Brown cubical rot in heartwood and sapwood.
"	Ridout Twp., Muskoka	*Ganoderma applanatum* (Pers.) Pat.	White mottled rot in heartwood and sapwood.
" "	Ridout Twp., Muskoka	*Hypoxylon blakei* Berk. and Curtis	Canker and dieback of stem.
" "	P.F.E.S., Chalk River	" "	
" "	Sudbury.....	Atmospheric pollution.....	Associated with browning and death of foliage.
Red Maple.....	Manitoulin Island.....	*Fomes igniarius* (L. ex Fr.) Gill.	Canker of stem.
Beech.....	Pine Lake, Dorset.....	*Fomes igniarius* (L. ex Fr.) Gill...	Canker of stem.
Oak.....	Mattawa.....	*Polyporus obtusus* Berk.....	Soft heart rot of stem.
"	Pine Lake, Dorset.....	" "	" "
"	P.F.E.S., Chalk River	" "	" "
Ironwood.....	Ridout Twp., Muskoka	*Fomes igniarius* (L. ex Fr.) Gill...	White heart rot in trunk.
"	Denbigh.....	" " ...	
"	P.F.E.S., Chalk River	" " ...	
"	P.F.E.S., Chalk River	*Fomes pinicola* (Sw.) Cooke.....	Brown cubical rot in heartwood and sapwood.
Basswood.....	P.F.E.S., Chalk River	" "	Brown cubical rot in heartwood and sapwood.

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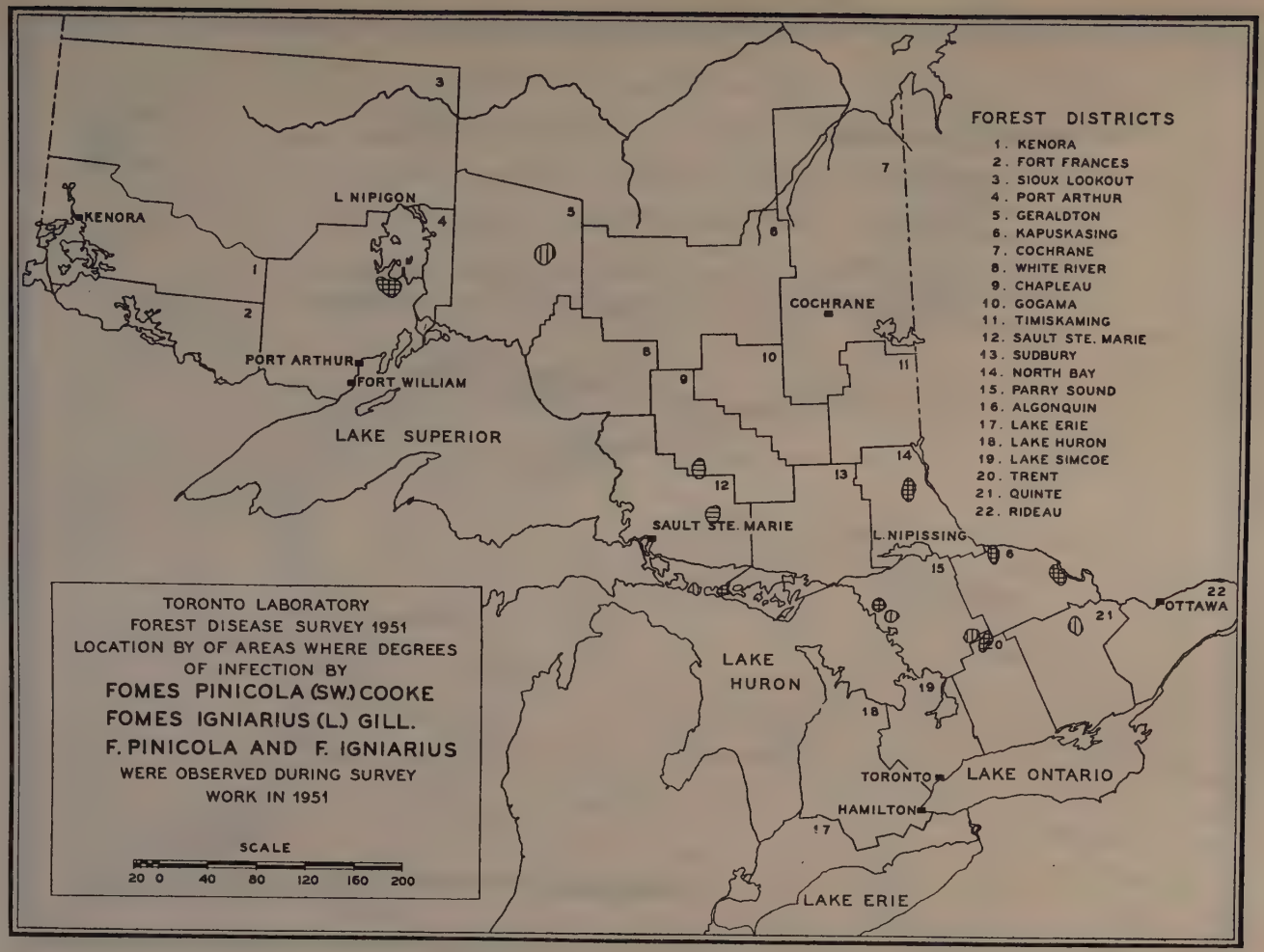
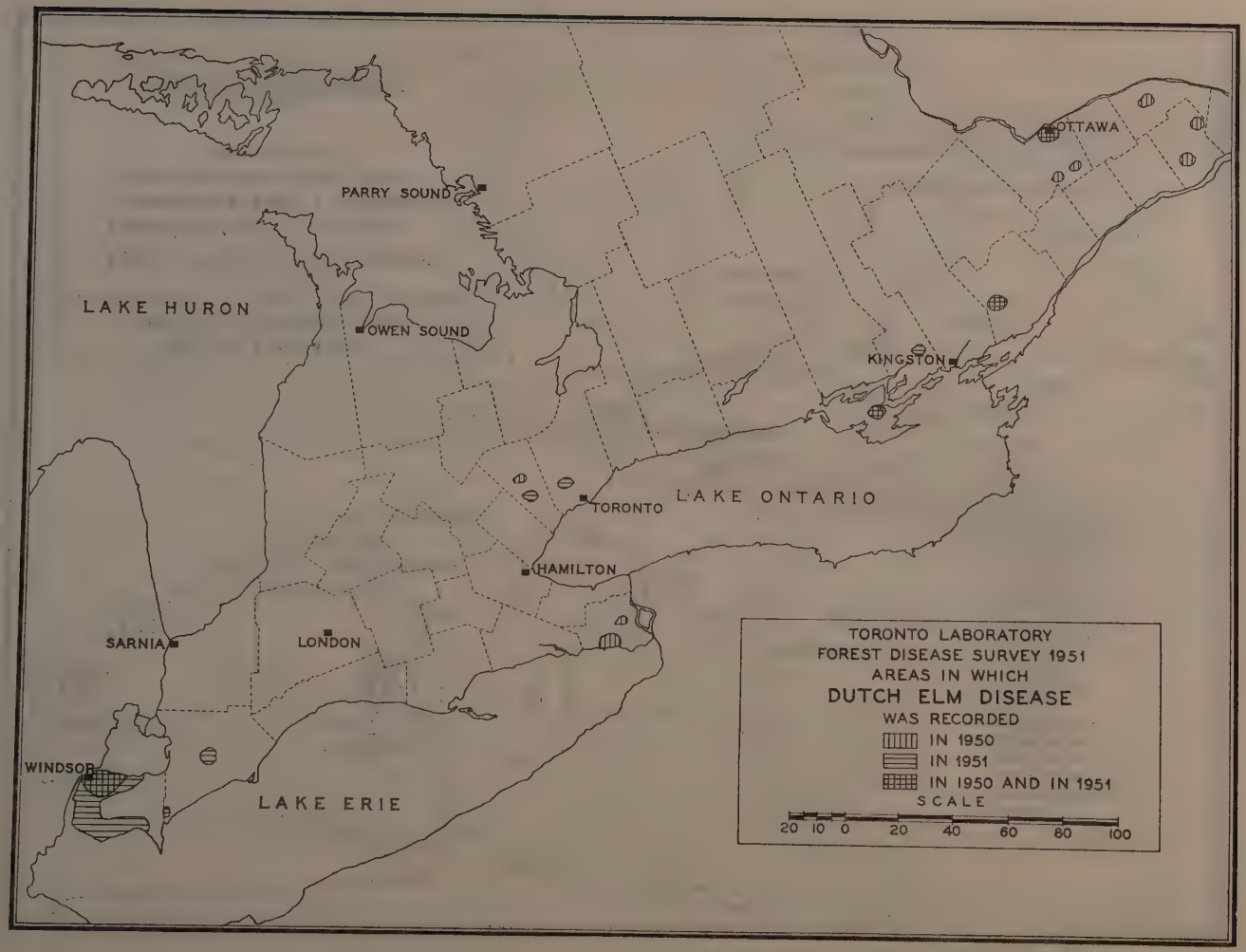

FOREST DISTRICTS
1. KENORA
2. FORT FRANCES
3. SIOUX LOOKOUT
4. PORT ARTHUR
5. GERALDTON
6. KAPUSKASING
7. COCHRANE
8. WHITE RIVER
9. CHAPLEAU
10. GOGAMA
11. TIMISKAMING
12. SAULT STE. MARIE
13. SUDBURY
14. NORTH BAY
15. PARRY SOUND
16. ALGONQUIN
17. LAKE ERIE
18. LAKE HURON
19. LAKE SIMCOE
20. TRENT
21. QUINTE
22. RIDEAU
L. NIPIGON
KENORA
PORT ARTHUR
FORT WILLIAM
LAKE SUPERIOR
COCHRANE
SAULT STE. MARIE
L. NIPISSING
OTTAWA
LAKE HURON
TORONTO
LAKE ONTARIO
HAMILTON
LAKE ERIE
TORONTO LABORATORY
FOREST DISEASE SURVEY 1951
LOCATION BY OF AREAS WHERE DEGREES
OF INFECTION BY
FOMES PINICOLA (SW.) COOKE
FOMES IGNIARIUS (L.) GILL.
F. PINICOLA AND F. IGNIARIUS
WERE OBSERVED DURING SURVEY
WORK IN 1951
SCALE
20 0 40 80 120 160 200


OTTAWA
PARRY SOUND
LAKE HURON
OWEN SOUND
KINGSTON
TORONTO
LAKE ONTARIO
HAMILTON
SARNIA
LONDON
WINDSOR
LAKE ERIE
TORONTO LABORATORY
FOREST DISEASE SURVEY 1951
AREAS IN WHICH
DUTCH ELM DISEASE
WAS RECORDED
IN 1950
IN 1951
IN 1950 AND IN 1951
SCALE
20 10 0 20 40 60 80 100

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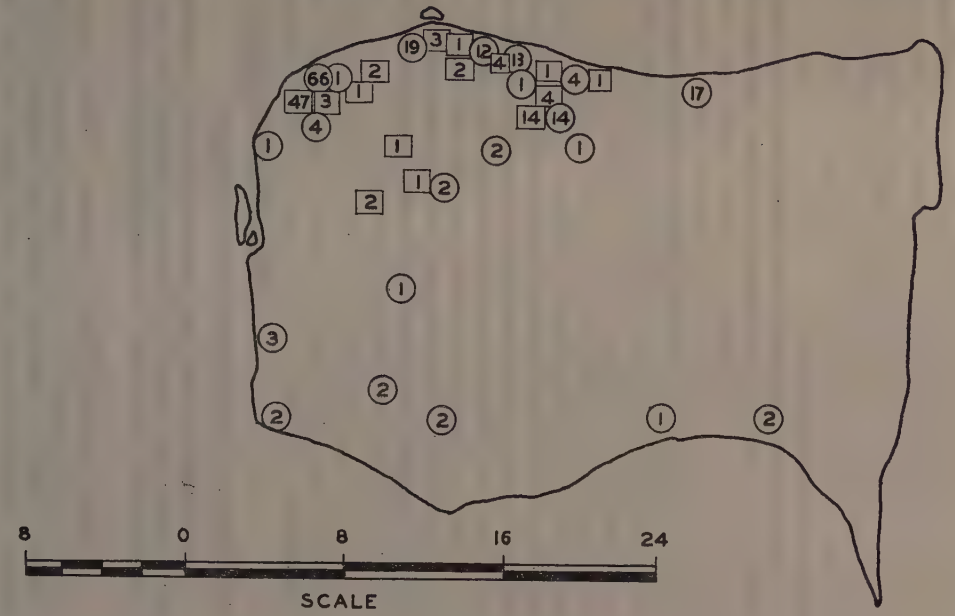
TORONTO LABORATORY

FOREST DISEASE SURVEY 1951

MAP OF ESSEX COUNTY SHOWING LOCATION OF AREAS IN WHICH DUTCH ELM DISEASE WAS RECORDED

NUMBERS IN SQUARES ARE THE 1950 RECORDS
NUMBERS IN CIRCLES ARE THE 1951 RECORDS



PRAIRIE PROVINCES

C. G. Riley, W. B. Denyer, and R. D. Whitney

Laboratory of Forest Pathology, Saskatoon, Sask.

In the Prairie Provinces, a systematic survey of forest diseases has scarcely been begun. Since the establishment of this Laboratory at Saskatoon in 1948 (the period covered by this report) information concerning the occurrence and distribution of forest diseases has been collected incidentally to conducting specific projects and other activities, within the ability of a staff comprising one to three professional personnel. A great many observations have been made and specimens collected. Relatively few positive identifications have been made, and therefore this report mentions only a small proportion of the diseases that have been observed. No further mention will be made here regarding many diseases that have not been authentically identified. Except for some of the more common diseases that can be identified with confidence in the field and by temporary summer assistants, this laboratory has had to depend largely on identifications by members of the Unit of Mycology in the Division of Botany and Plant Pathology in Ottawa, whose valued assistance is gratefully acknowledged.

Most of the field studies of this Laboratory have been concentrated in the following general areas: Riding Mountain National Park and Duck Mountain Forest Reserve in Manitoba; Candle Lake and Doré Lake in Saskatchewan; Athabasca-Slave Lake and Kananaskis Forest Experiment Station in Alberta. The last mentioned is in the East Slope Rockies Section of the Subalpine Forest Region, and all the other localities mentioned are in the Mixedwood Section of the Boreal Forest Region[1] (see accompanying map[1]). The localities where work has been done are distributed across the three Prairie Provinces, and represent particularly the Mixedwood Section. From observations in these localities, supplemented by knowledge of forest cover and sites in other parts and by specific reports from outside sources, it is quite safe to assume that certain diseases are of general distribution throughout the range of the hosts in the Prairie Provinces, at least as far north as the northern boundary of the Mixedwood Forest Section in Manitoba and Saskatchewan, and Lesser Slave Lake in Alberta. Little is known yet regarding forest disease conditions in the more northern parts which are not accessible by road.

The nomenclature of tree species is in accordance with "Native Trees of Canada", Forestry Branch, Canada, Department Resources and Development. Bulletin 61. 1949.

IMPORTANT DISEASES

Heart Rots in the Boreal Forest Region

This information was collected in the working areas mentioned in the introduction (see map). The term "general" is used to indicate that a disease is of common occurrence throughout the general region sampled.

Trunk Rots of White Spruce.—White pocket rot caused by *Fomes pini* (Thore) Lloyd; general. This fungus causes the greatest loss in merchantable volume. Infected mature trees are usually culls. Red heart rot caused by *Stereum sanguinolentum* Alb. and Schw. ex Fr.; general; causes substantial reduction in merchantable volume. Infected trees are rarely culls. Decay caused by *Stereum pini* Fr. is similar in occurrence and characteristics to that caused by *S. sanguinolentum*. Trunk rots are occasionally caused by *Fomes subroseus* (Weir) Overh. and *Odontia bicolor* (Fr.) Bres.

[1] Halliday, W. E. D. A forest classification for Canada. Can. Dept. Mines and Res., For. Serv. Bull. 89, 1937.

Butt Rots of White Spruce.—White pocket rot caused by *Polyporus circinatus* Fr.; general. The most common butt rot. May be locally rare where *Flammula connissans* Fr. causes the predominant butt rot. Although the decay results in little reduction in merchantable volume, it may be of great importance as a contributory factor in windfall. This is true of butt rots generally. Decay caused by *Coniophora puteana* (Schum. ex Fr.) Karst., general. Frequently occurs in association with the rots caused by *P. circinatus* and *Flammula connissans*; common in Alberta, occasional in Manitoba, not reported in Saskatchewan. Occasionally, decay extends well above breast height. Butt rot caused by *Armillaria mellea* Vahl ex Fr.; general. May be important in suppressed trees or on poor sites. Decay caused by *Merulius himantioides* Fr. reported from Manitoba. Not common.

Heart Rots of Black Spruce.—The characteristics of these decays are generally similar to the same kinds in white spruce. Trunk rots caused by *Fomes pini*, *Stereum sanguinolentum*, and *S. pini*. Butt rot caused by *Polyporus circinatus* and *Coniophora puteana*. Decay caused by *Corticium galactinum* (Fr.) Burt, reported only from Manitoba.

Balsam Fir (*Abies balsamea* (L.) Mill.).—Trunk rot caused by *Stereum sanguinolentum*, general, and by *S. chailletii* Pers., Manitoba only. Butt rots caused by *Coniophora puteana* and *Merulius himantioides*, occasional, Manitoba only.

Heart Rots in the Subalpine Forest Region, Alberta

The characteristics of the decays are generally the same as described for the Boreal Forest Region.

Trunk Rots of White Spruce.—Decays caused by *Fomes pini*, *Stereum sanguinolentum*, and *Stereum pini* occur frequently, while those caused by *Stereum sulcatum* Burt, *Omphalia campanella* Fr., and *Lenzites saepiaria* Wulf. ex Fr. occur occasionally.

Butt Rots of White Spruce.—Rots caused by *Polyporus circinatus*, *Flammula connissans*, and *Armillaria mellea* occur frequently. Brown cubical butt rots were generally rare, that caused by *Polyporus balsameus* Peck occurring only occasionally.

Heart Rots of Lodgepole Pine.—Trunk rots caused by *Fomes pini*, *Stereum pini*, and *Stereum sanguinolentum*. Butt rots caused by *Polyporus circinatus* and *Flammula connissans*.

Heart Rots of Alpine Fir.—Trunk rot caused by *Fomes pini* and one infection of *Stereum chailletii*. The only butt rot so far reported is that caused by *Armillaria mellea*.

Heart Rots of Douglas Fir

Trunk rots caused by *Fomes pini* and *Stereum sanguinolentum*. Butt rot caused by *Polyporus circinatus*.

Dwarf Mistletoe

As far as reports indicate, this parasite of jack pine, *Pinus banksiana* Lamb., is confined to the Prairie Provinces where its distribution is general. The most easterly points from which it has been reported are The Pas, Cowan, Stead, and the Sandilands Forest Reserve, all in Manitoba. The northern limit of its range is not known.

In many localities stands of jack pine are rendered valueless for utilization by the massive brooming and stunting caused by mistletoe. This condition tends to be most severe on poorer jack-pine sites. The same species of mistletoe has been observed on lodgepole pine (*P. contorta* Dougl. var. *latifolia* Engelm.) at Banff, Jasper, and other places. It probably is distributed throughout the range of this host in Alberta.

"Little-leaf" of White Elm

White elm, Ulmus americana L., is planted throughout the Prairie Provinces as an ornamental tree. In the spring of 1950, many elms that had been apparently healthy at the close of the previous season failed to come to leaf. In these, blossom clusters developed and then suddenly wilted. Between trees in this condition and those that developed normally, were all gradations of retarded and stunted development. All the related circumstances indicated that the primary cause of the trouble was killing of rootlets and root cambium by unusually low temperatures during very long periods in the preceding winter of 1949-50. It is believed that a contributory factor was the occurrence of unseasonably high temperatures during late autum in 1949, as a result of which the roots entered the winter in an insufficient state of dormancy. A probable secondary factor was the invasion of the injured roots by various fungi, including at least one species of *Verticillium*. The most severely affected trees, including many large-sized, well-established ones, died. In others, twig and branch die-back occurred in all degrees. These conditions are not unusual in many parts of the Prairie Provinces. Observations made prior to 1950 indicate that this is not an uncommon type of physiological disease in this region, though it was unusually damaging in 1950. Elm occurs naturally only in the southeastern part of this region. Elsewhere, this tree is well outside of its natural range and it is not surprising that a very severe winter should affect it in this manner.

Winter Drying of Conifers

On the prairies, blue spruce, *Picea pungens* Engelm., and Scots pine, *Pinus sylvestris* L., which are commonly planted as ornamental trees, are subject to severe injury by winter drying. White spruce *P. glauca* (Moench) Voss, which is planted extensively for ornament and windbreaks, suffers to a lesser degree. The injury is a result of loss of moisture from the foliage in late winter and early spring when warm mid-day sunshine and drying winds create conditions of high evaporation, while low temperature and dormancy of the roots prevent replacement. Usually the buds survive and, though the mature foliage may be killed, this effect becomes inconspicuous with the development of new growth. Occasionally buds, branches, or entire trees succumb, sometimes following repeated injury in successive seasons. A wide variation in the degree of susceptibility in individual trees has been noted. In certain instances trees which were on the north side of a group, and thus were mostly shaded from direct sunlight, were severely affected while those on the south side were not. This is the reverse of the usual condition.

On the mountain slopes in the vicinity of Banff and elsewhere on the east slopes of the Rocky Mountain Range in Alberta, lodgepole pine, and, to a less degree, other conifers, were severely affected in 1950 by winter drying. In many places this presented the common red belt phenomenon at higher elevations. Death of branches, tops, or entire trees followed in many instances, though recovery was the general rule. In 1951 the extent of winter drying in the areas observed was negligible.

Injury by 2, 4-D Weed Killer

Abnormal growth of Manitoba maple, *Acer negundo* L. var. *interius* (Britton) Sarg., is believed to be caused by 2, 4-D applied to farm crops and lawns. The conspicuous symptoms are elongation of petioles and midribs, and under-

development of leaf blades. In extreme cases the leaves consist of little more than main ribs. This condition is of quite general occurrence. In aspen, elongation and contortion of petioles has been observed in association with nearby applications of 2, 4-D.

OTHER NOTEWORTHY DISEASES

The use of the word "general" indicates general occurrence throughout the region.

Balsam Fir.—Yellow witches' brooms caused by *Melampsorella cerastii* (Pers.) Schroet. Hamiota, Man. Needle cast caused by *Hypodermella nervata* Darker. East Braintree, Man.

Alpine Fir.—Leaf rust on seedlings caused by *Uredinopsis macrosperma* (Cooke) Magn. Kananaskis, Alta. Brown felt blight caused by *Herpotrichia nigra* Hart. Altitude 7000 feet, Kananaskis, Alta.

Creeping Juniper.—Rust caused by *Gymnosporangium juvenescens* Kern (Rust on *Amelanchier* sp. in the vicinity). Drumheller, Alta.; Duck Lake, Sask.

White Spruce.—Needle rust caused by *Chrysomyxa ledicola* (Peck) Lagerh. Meadow Lake, Snowden, Prince Albert National Park, Candle Lake, and Big River, Sask.; Riding Mountain National Park, Man. Yellow witches' broom caused by *Peridermium coloradense* (Diet.) Arth. & Kern. Riding Mountain National Park, Man.; Calling Lake, Alta. Needle rust caused by *Pucciniastrum americanum* (Farl.) Arth. Elphinstone, Man. Cone rust caused by *Chrysomyxa pyrolae* (DC.) Arth. Riding Mountain National Park, Manitoba; Kananaskis, Alta. Telial stage on leaves of *Pyrola* sp. Kananaskis, Alta.; Big River, Sask.; Riding Mountain National Park, Man. Needle cast caused by *Lophodermium filiforme* Darker. Russell, Man.

Black Spruce.—Yellow witches' brooms, caused by *Peridermium coloradense* (Diet.) Arth. & Kern. Meadow Lake, Sask.

Blue Spruce.—Shoestring root-rot caused by *Armillaria mellea.* Some trees fatally injured. Miami, Man.

Spruce (*Picea* sp.).—Cone rust caused by *Chrysomyxa pyrolae.* (DC.) Arth. Hole River, Man.

Jack Pine.—Canker on stem of small jack pine caused by *Cronartium comandrae.* Moose Lake, Man. Stem rust caused by *Cronartium coleosporioides* (Diet. & Holw.) Arth. Duck Mountain Forest Reserve and Virden, Man. Gall rust caused by *Cronartium cerebrum* Hedgc. & Long. Prince Albert, Sask. Canker caused by *Peridermium* sp. Doré Lake, Sask. *Arceuthobium americanum.* (See under preceding section "Important Diseases"). *Wallrothiella arceuthobii* (Pk.) Sacc. Attacking mistletoe on jack pine. Common in the vicinity of Meadow Lake and Prince Albert, Sask.

Lodgepole Pine.—Leaf rust caused by *Coleosporium solidaginis* (Schw.) Thüm. Kananaskis, Alta. Twig rust caused by *Cronartium comandrae.* Kananaskis, Alta. Long canker caused by *Peridermium* sp. Kananaskis, Alta.

Speckled Alder.—Fascination of catskin scales caused by *Taphrina robinsoniana* Gies. East Braintree, Man.

Saskatoon Berry.—Witches' brooms caused by *Apiosporina collinsii* (Schw.) Höhnel. Prince Albert and Emma Lake, Sask.

Dwarf Birch.—Leaf rust caused by *Melampsoridium betulinum* (Pers.) Kleb. Kananaskis, Alta.

White Birch.—Heart rot caused by *Poria obliqua* (Pers. ex Fr.) Bres. Mirror Landing and Calling Lake, Alberta; Riding Mountain National Park, Man.

Birch (Ornamental).—Dieback caused by *Cytospora* sp. associated with injury by the bronze birch borer. Saskatoon, Sask.

Awned Sedge.—Rust caused by *Puccinia caricis-shepherdeae* Davis. Candle Lake, Sask.

Cotoneaster.—Canker and dieback caused by *Cytospora* sp. Waskada, Man.

Ash.—Leaf rust caused by *Puccinia peridermiospora* (Ellis & Tr.) Arth. Gainsborough, Sask.

Labrador Tea.—Leaf rust, telial stage caused by *Chrysomyxa ledicola* (Peck) Lagerh. Big River, Sask.

Balsam Poplar.—Canker and dieback caused by *Cytospora chrysosperma* (Pers.) Fr. Saskatoon, Sask. Stem canker caused by *Hypoxylon pruinatum* (Klotsch) Cooke. General. Die back caused by *Napicladium tremulae* (Frank) Sacc. Doré Lake, Sask. Powdery mildew caused by *Uncinula salicis* (DC.) Wint. Morinville, Alta.

Trembling Aspen.—Leaf rust caused by *Melampsora medusae* Thüm. Kananaskis, Alta. (Occasional larches on upper slopes). Rosetown, Sask. (Nearest known larch is at Indian Head, Saskatchewan, or in the Rocky Mountains, both several hundred miles away). White heart rot caused by *Fomes igniarius* (L. ex Fr.) Gill. General. Branch galls caused by *Macrophoma tumefaciens* Shear. Red Deer, Alta. Stem canker caused by *Cytospora chrysosperma.* Prince Albert, Sask.

Black Cottonwood.—Powdery mildews on leaves caused by *Uncinula* sp. and *Erysiphe* sp. Kananaskis, Alta.

Russian Poplar.—Canker and dieback caused by *Cytospora chrysosperma* (Pers.) Fr. Saskatoon, Sask.

Pin Cherry.—Black knot caused by *Dibotryon morbosum* (Schw.) Theiss. & Syd. Doré Lake, Sask.

Sand Cherry.—Black knot caused by *Dibotryon morbosum.* Spruce Woods Forest Reserve, Man.

Alderleaf Buckthorn.—Leaf rust caused by *Puccinia coronata* Cda. Candle Lake, Sask.; Riding Mountain National Park, Man.

Prickly Rose.—*Phragmidium rosaeacicularis* Liro. Candle Lake, Sask.

Golden Willow.—Canker caused by *Cytospora chrysosperma.* Regina, Sask.

Grey Willow.—Tar spot caused by *Rhytisma salicinum* (Pers.) Fr. Candle Lake, Sask.; Kananaskis, Alta.

Yellow Willow.—Witches' brooms. Cause not determined. Borden, Sask.

Willow.—Leaf rust caused by *Melampsora bigelowii* Thum. Prince Albert National Park, Sask. Tar spot caused by *Rhytisma salicium* (Pers.) Fr. Candle Lake, Sask.

Elderberry.—Canker and dieback caused by *Nectria* sp. Sutherland, Sask.

Low Buffalo-berry.—Leaf rust caused by *Puccinia coronata* Cda. Candle Lake, Sask. Leaf rust caused by *Puccinia caricis-shepherdeae* Davis. Prince Albert, Sask.

Mountain Ash.—Canker and dieback caused by *Cytospora chrysosperma.* Saskatoon, Sask.

White Elm.—Little leaf (see under preceding section "Important Diseases"). Canker caused by *Cytospora chrysosperma.* Twig dieback caused by *Tubercularia ulmea* J. C. Carter. Regina, Sask.

Chinese Elm.—Canker and dieback caused by *Nectria cinnabarina* (Tode) ex Fr. Bounty, Sask.; Lac du Bonnet, Man.; Indian Head, Sask. Twig and stem canker caused by *Nectria galligena* Bres. Indian Head, Sask.

Dry-ground Cranberry.—Yellow witches' brooms caused by *Puccinia-strum goeppertianum* (Kühn) Kleb. (occurring in a spruce-balsam fir stand), Candle Lake, Sask.

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Following are the names of persons who have submitted specimens that have been identified. Many others have submitted specimens and observations that are not included in this report, and have assisted in other ways. All such co-operation is greatfully acknowledged.

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KEY TO FOREST REGIONS AND FOREST SECTIONS AS SHOWN ON FOREST DISEASE SURVEY MAP OF THE PRAIRIE PROVINCES

Boreal Forest Region

Key Number	Forest Section
B 14	English River
B 15	Manitoba Lowlands
B 16	Aspen-Oak
B 17	Aspen-Grove
B 18	Mixedwood
B 19	Foot-hills
B 20	Hyper-Churchill
B 21	Nelson River
B 22	Northern Coniferous
B 23	Mackenzie Lowlands
B 27	Northern Transition

Subalpine Forest Region

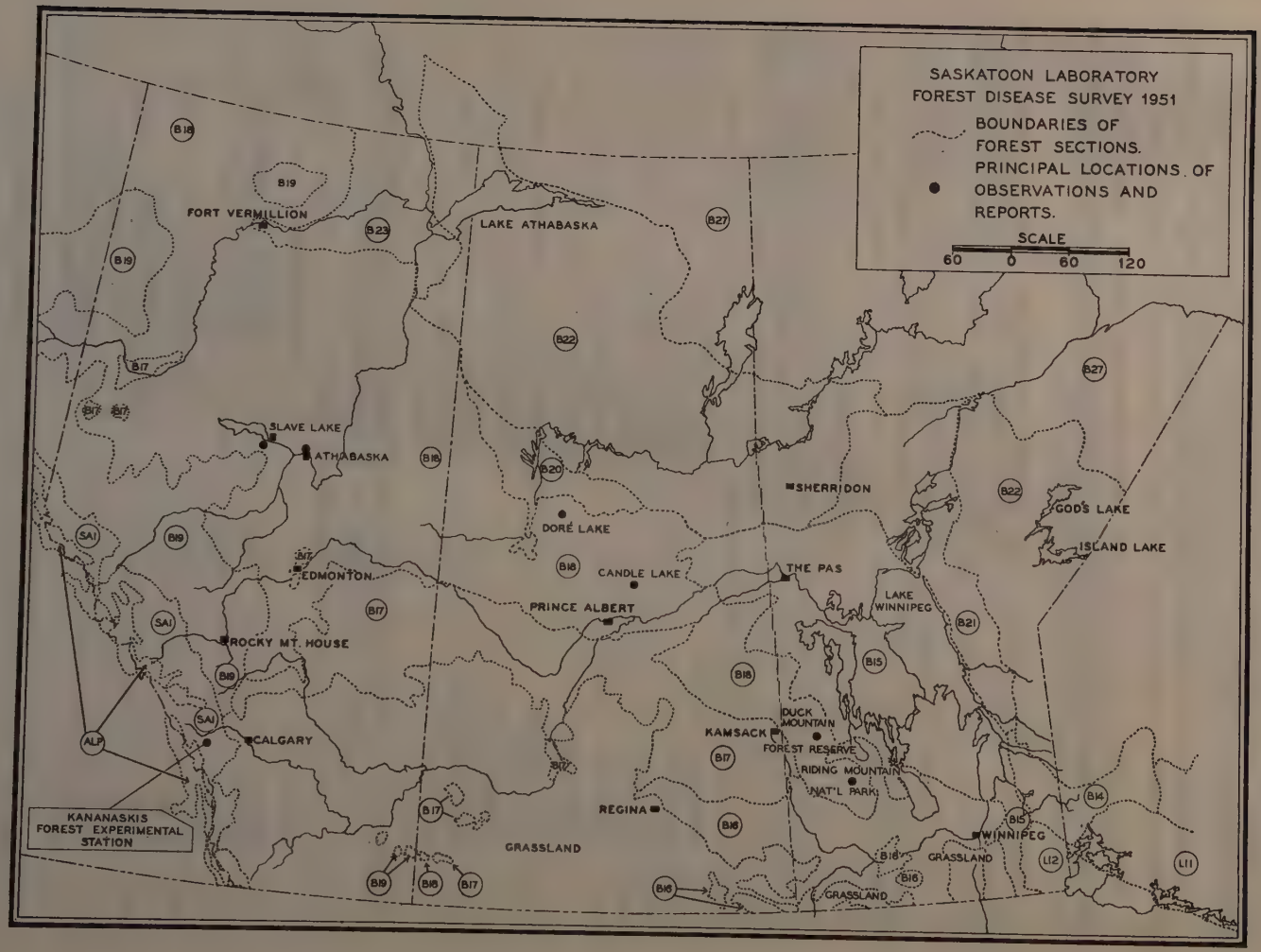
SA 1	East Slope Rockies

Great Lakes–St. Lawrence Forest Region

L 12	Rainy River

Alpine Regions

Alp.


SASKATOON LABORATORY
FOREST DISEASE SURVEY 1951
BOUNDARIES OF FOREST SECTIONS.
PRINCIPAL LOCATIONS OF OBSERVATIONS AND REPORTS.
SCALE
60 0 60 120
FORT VERMILLION
LAKE ATHABASKA
SLAVE LAKE
ATHABASKA
DORÉ LAKE
SHERRIDON
GOD'S LAKE
ISLAND LAKE
EDMONTON
CANDLE LAKE
THE PAS
PRINCE ALBERT
LAKE WINNIPEG
ROCKY MT. HOUSE
CALGARY
KAMSACK
DUCK MOUNTAIN FOREST RESERVE
RIDING MOUNTAIN NAT'L PARK
REGINA
WINNIPEG
GRASSLAND
KANANASKIS FOREST EXPERIMENTAL STATION

PROVINCE OF BRITISH COLUMBIA

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INTRODUCTION

The objectives of the Forest Disease Survey in British Columbia are to record, classify, and interpret the significance of all diseases affecting forest stands throughout the course of their natural development from seedling to maturity. This program has been under way for several years with respect to decay-producing fungi, but has only recently been extended in other directions. Thus, studies are now being undertaken in plantation stock and in immature forests, and have embraced physiological diseases as well as a wide range of forest fungi. Coincident with this increased emphasis on survey, sampling techniques have been revised to provide more extensive coverage.

To date, a relatively small number of fungi have been classed as being of economic importance. Although these few have proved their ability to cause extensive damage, the disease-producing capabilities of the remaining groups are largely unknown. The sporadic outbreaks of cone rust on spruce, stem canker on lodgepole pine, and dieback of Douglas fir serve to illustrate the need for accurate information relative to the occurrence, host range, and biological capabilities of all forest fungi, including those that are classified at present, perhaps for reason of insufficient knowledge, as of secondary or minor consequence.

The vast area requiring analysis and the inherent problems in sampling and interpretation of forest disease prevent the sudden achievement of the full objectives of the Survey. In recognition of this fact, the Survey in British Columbia has been designed as a specialist service, in part to examine and maintain continuing records on representative sample areas, and in part to investigate and report on conditions brought to its attention by other agencies and personnel. Thus, the Victoria Laboratory solicits the co-operation of everyone in a position to submit material or otherwise contribute to the success of the Forest Disease Survey.

The unusually dry summer during 1951 appeared to reduce the incidence of many forest fungi. A total of 2,093 collections were made during the year. These may be summarized by host as follows:

Coniferous Hosts	Collections
Cedar, western red	34
Douglas fir	147
Fir, alpine	424
Fir, amabilis	63
Fir, grand	18
Hemlock, western	578
Hemlock, mountain	4
Juniper, dwarf	1
Juniper, Rocky Mountain	9
Larch, western	11
Pine, lodgepole	83
Pine, western white	233
Pine, white bark	1
Pine, ponderosa	12
Spruce, black	9
Spruce, Engelmann	8
Spruce, Sitka	2
Spruce, white	141
Yew	1
	1,779

Deciduous Hosts	Collections
Alder	51
Arbutus	27
Ash, mountain	2
Birch	16
Cottonwood	24
Cherry	1
Dogwood	1
Hazel	1
Maple, bigleaf	21
Oak, Garry	1
Trembling aspen	10
Willow	32
	187
Miscellaneous Hosts	127
Total	2,093

Douglas Fir

Decay sampling has been extended to the Harris and Caycuse Creek areas on Vancouver Island. Decay was found to be of minor importance with respect to quantitative loss. It was noted, however, that most of the decay was associated with *Polyporus schweinitzii* Fr., the cause of a root and butt rot believed to contribute to windthrow susceptibility.

Scouting for the *Rhabdocline* needle cast disease indicated that the disease was not nearly so severe in areas that were inspected and rated as heavily infected during 1950. Thus, the Christmas tree plantations between Cranbrook and Invermere (Nelson Forest District) showed only a trace of new infection during 1951. *Rhabdogloeum* needle cast was more evident during 1951 in this latter region, but damage was negligible.

An extensive area of dieback in plantation stock was reported in the Campbell River area (Vancouver Forest District) in October. *Phomopsis* canker and sunscald were believed to have contributed to the condition, but as the damage had been initiated during the early part of the growing season, it was not possible to verify the causal agent at the time of inspection.

Decay of Alpine Fir

Preliminary decay sampling of alpine fir was undertaken in the vicinity of Summit Lake (Prince George Forest District) and Bolean Lake (Kamloops Forest District) during 1951. Both areas were found to contain appreciable volumes of decay:

Region	Number of Sample Plots	Number of Trees	Average Age	Average Percentage of Defect (f.b.m.)
Summit Lake	8	155	192	45
Bolean Lake	6	78	194	30

(Preliminary Values)

At Summit Lake an appreciable number of dead balsam were encountered. Their advanced deterioration made it impossible to determine the initial cause of mortality. At Bolean Lake, only 21 of the 78 sample trees were free from defect and it was evident that selective cutting methods designed to eliminate fir and encourage the growth of spruce would be required.

Deterioration studies were continued in the Crescent Spur area (see also White Spruce).

Decay of Amabilis Fir

Survey compilations completed to date indicate that losses from decay in mature amabilis fir are not excessively high:

Region	Number of Sample Plots	Number of Trees	Average Age	Average Percentage of Defect (f.b.m.)
Terrace	56	473	315	30

The analysis has provided an average cull factor of only 30 per cent. Very few trees, however, were free from defect, and most of these were confined to the younger age and smaller diameter classes. The Indian paint fungus, *Echinodontium tinctorium* Ellis & Everh., was responsible for 55 per cent and *Fomes pini* (Thore) Lloyd for 17 per cent of the total decay. It is of interest to note that the relative importance of these two fungi differs appreciably from that recorded for hemlock in the same region.

Decay of Western Hemlock

Analytical decay studies of mature western hemlock were completed during 1951 in the vicinity of Terrace (Prince Rupert Forest District) and the Big Bend region (Kamloops Forest District). Investigations have confirmed previous references relative to the decadence of mature hemlock in both regions:

Region	Number of Sample Plots	Number of Trees	Average Age	Average Percentage of Defect (f.b.m.)
Terrace	56	579	340	50
Big Bend	30	709	243	75

(Preliminary values)

Although hemlock is subject to appreciable loss from decay in both areas, it is evident that more serious losses have developed in the Big Bend region. Further evidence in this regard is obtained through an analysis of maximum loss recorded on sub-plots. These latter values are 81 and 97 per cent for the Terrace and Big Bend regions respectively. Most of the decay was associated with the Indian paint fungus and with *Fomes pini*. The former has long been regarded as the most important fungus associated with decay in hemlock in the Interior. It has been reported, however, in only two localities in the south-coastal region. *Fomes pini*, on the other hand, is considered to be ubiquitous with western hemlock, yet to be of minor importance with hemlock in the Interior. It is therefore of interest to note the values derived through recent disease surveys of hemlock in four isolated areas:

Region	Percentage of Total Decay Caused By:	
	Echinodontium tinctorium	*Fomes pini*
Terrace*	16	38
Big Bend*	53	23
Alberni	0	13
Queen Charlotte Islands	0	13

(* Preliminary values)

Since the preceding values refer to combined sample plot averages, they do not necessarily indicate the full capabilities of the fungi listed. Further analysis of the basic data have shown, for example, that *Fomes pini* contributed over 40 per cent of the total decay in one sub-plot in the Big Bend region and over 50 per cent of the total decay in one locality at Terrace.

An examination of second-growth hemlock in the vicinity of Revelstoke (Kamloops Forest District) has shown that under certain conditions, as yet undefined, heartwood decay may be of considerable importance in young stands. An analysis of the stem frequency distribution by age in this area indicated that the existing stand became established in part following a major stand disturbance prior to 1800. The cyclic mortality of an overmature stand, represented today by scattered veterans from 240 to 320 years of age, was indicated. Present knowledge of decay is not adequate to interpret the significance of changes of this nature relative to the susceptibility of the second crop. It is of interest to record, however, that the relatively vigorous understory contained approximately 15 per cent defect at 100 years and 31 percent defect at 150 years. These values are considerably higher than those anticipated and recorded in coastal hemlock of the same age and site index.

Dwarf Mistletoe on Western Hemlock

A severe infection of the dwarf mistletoe (*Arceuthobium campylopodum* forma *tsugensis* (Rosendahl) Gill) was reported in the Alouette Lake region (Vancouver Forest District). Subsequent examinations showed an average of 90 per cent infection in a 60-100 year old stand. Most of the trees were in a very weakened or deformed condition. A mortality of 10 per cent was recorded and it was evident that the stand would not reach merchantable size or condition within a normal rotation.

Mistletoe on Western Larch

A heavy infection of mistletoe (*Arceuthobium campylopodum* (Piper) Gill) was noted in the St. Mary's River area (Nelson Forest District). It was evident that the disease had been prevalent in this area for considerable time. Infections ranged from medium to very heavy, and mortality in all age classes was noted.

Mistletoe on Lodgepole Pine

Severe infection of the dwarf mistletoe (*Arceuthobium americanum* Nutt.) was observed between Clinton and Williams Lake (Kamloops Forest District). Subsequent scouting indicated that deformation of the main bole and losses in increment were general throughout the region. Light to heavy infection was also recorded from Prince George to Burns Lake (Prince George Forest District).

Winter injury was severe in the lower Kootenay Valley from Yahk to Cranbrook (Nelson Forest District). Greater activity was subsequently noted in the needle cast diseases in this area.

Decay of Engelmann Spruce

Decay analyses of Engelmann spruce, undertaken concurrently with those of alpine fir in the Bolean Lake area, have shown little evidence of excessive cull:

Region	Number of Sample Plots	Number of Trees	Average Age	Average Percentage of Defect (f.b.m.)
Bolean Lake	6	78	326	19

(Preliminary values)

The greater part of this loss was confined to the lower trunk, thus qualitative as well as quantitative loss would be worthy of consideration. At the request of the British Columbia Forest Service, further studies are contemplated to determine the influence of basal infection to windthrow susceptibility.

Decay and Rusts of White Spruce

Deterioration studies, undertaken at the request of, and in co-operation with, the British Columbia Forest Service, were continued in an extensive area of 1948 windfall in the Crescent Spur area (Prince George Forest District). Some 566 trees, or 52 per cent of the total number 6 inches and greater at d.b.h., were found to have been partially or completely uprooted or broken off. White spruce was found to be more susceptible than the associated species, alpine fir, to uprooting:

(Basis 20 Sample Plots)

Species	Number of Trees	Number Uprooted	Percentage Uprooted	Number Broken	Percentage Broken
White Spruce	476	152	32	97	20
Alpine Fir	588	110	19	207	35

Conditions similar to those recorded above are believed to prevail over most of the 1,100 acres affected in 1948. It is evident, therefore, that interpretations derived from the present study relate to an appreciable volume of timber. Studies conducted during 1950 indicated that deterioration by wood-destroying fungi was negligible to that time. Most of the recorded loss was attributed to sapstain. Further sampling during 1951, however, showed a marked increase in the activity of fungi and the initial development of saprot. Field observations have indicated that red heart rot, caused by *Stereum sanguinolentum* Alb. and Schw. ex Fries, is responsible for approximately 75 per cent of the sapwood infection.

The yellow witches' broom of spruce, caused by *Peridermium coloradense* (Diet.) A. & K., was recorded in the general disease survey as occurring in 14 out of 16 localities investigated between Prince George and Burns Lake. The disease was found to be most prevalent in the vicinity of Cluculz Lake. Stem malformations and reduced increment were recorded.

An outbreak of sprucé cone rust caused by *Chrysomyxa pyrolae* (DC.) Arth. in the vicinity of Prince George was found to be of less significance than the epidemic of 1949. The current outbreak, however, appeared to be more widely distributed with collections reported from Aleza Lake to Germanson Landing.

OTHER NOTEWORTHY DISEASES

Pole Blight of Western White Pine

Pole blight is a disease of undetermined cause affecting stands of western white pine approximately between the ages of 40 and 100 years. Prior to 1949, it was believed that the disease was only of regional importance and confined to Idaho, western Washington, and eastern Montana. In 1949, however, the disease was reported in British Columbia. Surveys have shown that it is widely distributed throughout the range of white pine in the Interior and that infection ratings may vary from 3 to 45 per cent. Surveys during the past year have confirmed the presence of pole blight in at least two areas on Vancouver Island and one area on the adjacent mainland. Examinations indicate that

the disease has been present on the Coast for at least 8 years. Although additional surveys may well provide information of value with respect to distribution, incidence, importance, and rate of spread, major efforts have recently been directed towards the cause and control of the disease. Inoculation experiments have been conducted with fungi isolated from diseased tissues, and at least one fungus has been found to be capable of causing lesions and pitch exudation, two of the several symptoms of this complex disturbance. To provide information on the effect of sanitation thinning, 328 diseased pine have been removed from thirty-four 0·2 acre sample plots in the Arrow Lakes region (Nelson Forest District), and continuing records will be maintained to determine if any protective value has been afforded the residual pine.

Canker of Lodgepole Pine

Previous evidence indicates that the stem cankers of lodgepole pine are of relatively infrequent occurrence and minor importance. It is of interest to note, therefore, that the stem canker caused by *Atropellis* sp. was found to extend within the limits of sampling in the vicinity of Burns Lake, Fort St. James, Vanderhoof, and Summit Lake in the Prince George Forest District. The fungus appeared to be contributing to mortality only in the Summit Lake area. A combined infection by the stem cankers *Atropellis* sp. and *Cronartium stalactiforme* Arth. & Kern (*C. coleosporioides* (Diet. & Holw.) Arth.) in the Beaver Lake area (Kamloops Forest District) showed an infection rating of over 70 per cent with serious malformation of the main bole and subsequent mortality resulting from secondary invaders. This record of high infection and severe damage is worthy of consideration following the apparent widespread distribution of the disease.

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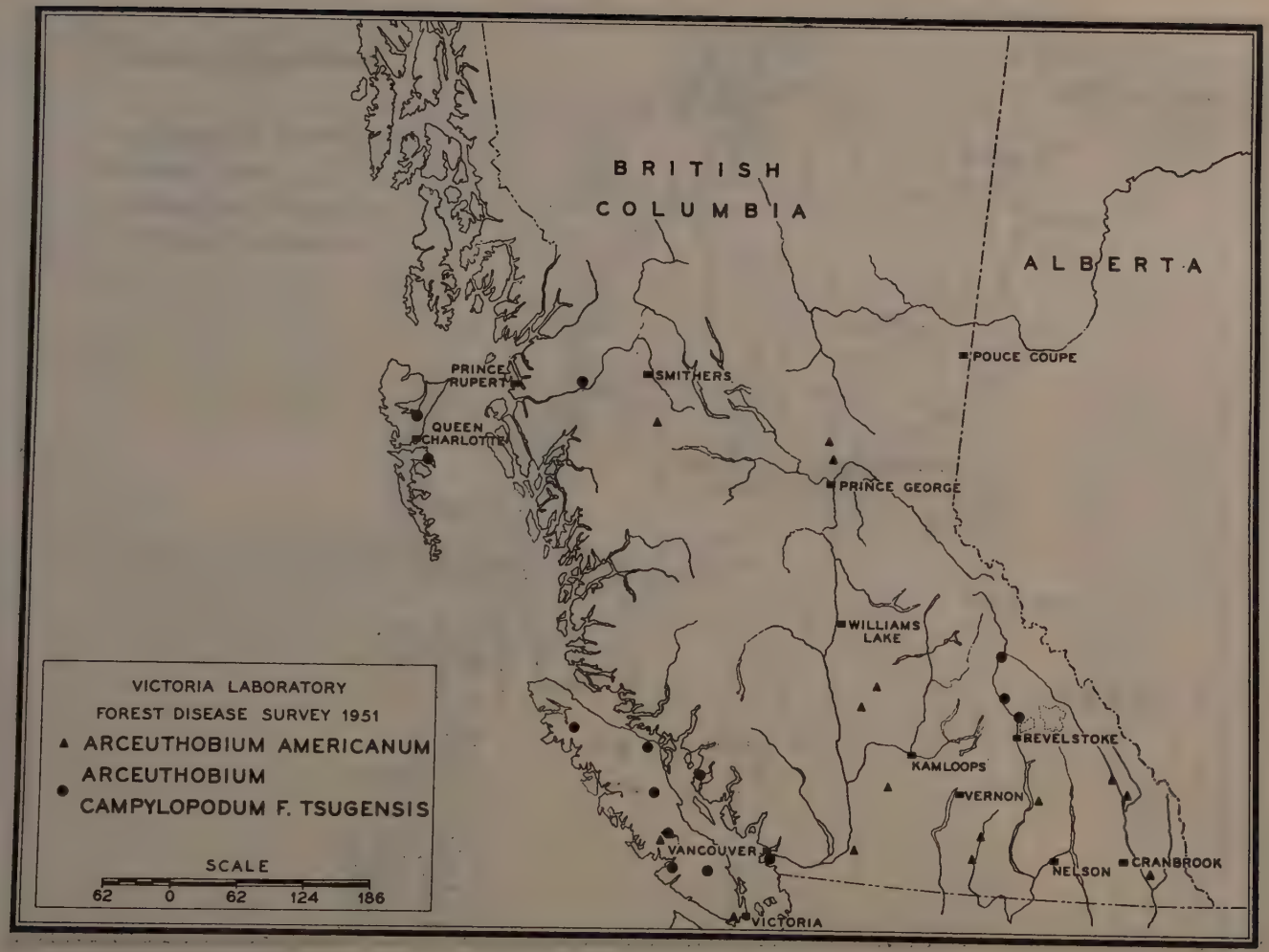
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